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FEBRUARY 15, 1953

Review-Forecast Issue

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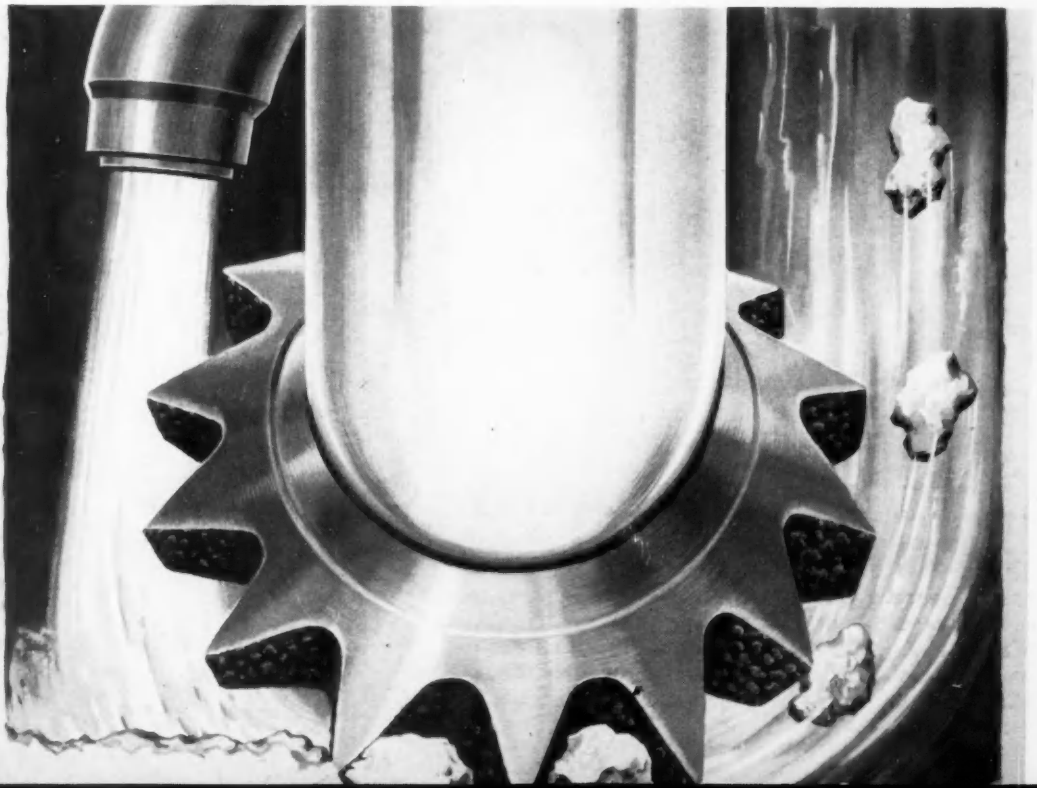

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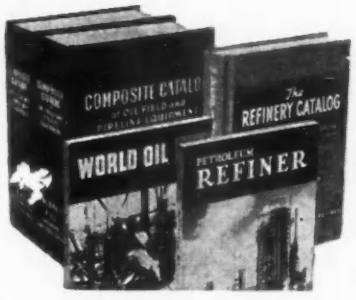

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A Quick Guide to

WORLD OIL this month . . . .

Current Outlook

The Petroleum Panorama. The U. S. oil industry is nearer normal than since before World War II. Competition is back. Productive capacity is 1 million barrels a day above demand. Prices are steady but likely to seek different levels when freed of controls. For a fast, fact-filled analysis of oil in 1953, see The Changing Panorama, **Page 51.**

√

Petroleum Demand. The indicated volume of crude production to be needed in 1953 is 61,000 barrels per day more than the actual output last year. This 1 percent increase is less than usual because (1) no net increase in stocks of crude or products is projected this year, whereas 1952 production included 100,000 barrels a day that went into crude and refined product storage; (2) demand for oils will be met in an increased proportion by natural gasoline, expected to be produced in 4.8 percent greater volume than last year; and (3) an increase in imports. **Page 54.**

√

Exports and Imports. The U. S., for five consecutive years a net importer, will bring in an even greater proportion of crude and refined oils this year. Movement of crude into the U. S. averaged 571,000 barrels daily during 1952, and this year imports are expected to reach 641,000 barrels per day. The difference between all oils entering the country and those going out averaged 532,700 barrels daily during 1952. The forecast difference for 1953 is 685,000 barrels daily, which would be a record. **Page 66.**

√

Petroleum Prices. Fractional increases, but no wholesale changes, are expected to follow the death of price controls on April 30. Contrary to the former administration's fear that decontrol of petroleum products would cost the U. S. $1 billion a year, the oil industry will return to the American Way with ample stocks of crude and most refined products and a market which, if anything, is bearish. The play of keen competition along the East Coast is an example. There, amply-stocked residual oil is selling below parity due to a warmish winter. For an over-all price picture, see **Page 68.**

√

Stocks of Oils. High to an unhealthy degree at year's end were stocks of distillate, residuals and lubricants, leading to reports of below-ceiling sales prices. On a day's supply basis, distillate stocks were 9 percent greater than a year before, residuals 14.6 percent, and lubricants 16.9 percent. Crude, kerosine and motor fuel stocks were at satisfactory levels. **Page 74.**

√

Oil-Using Units. The upward trend in use of petroleum products continues—sharply in some instances, moderately in others. There are now 53 million motor vehicles in use, 20,600 railroad diesels, 4.4 million farm tractors, 6.4 million home oil burners, and 20 million gas customers. **Page 76.**

√

Steel for Oil. Barring work stoppages in the steel industry and a quickened military buildup, there will be sufficient steel to permit completion of the industry's drilling, pipe line construction and refinery expansion program this year. The domestic steel industry's capacity in 1953 will be 117.5 million ingot tons, an increase of 8.3 percent over 1952 capacity. For an analysis of a materials situation so vital to the oil industry, see **Page 77.**

√

Legislative Outlook. Oil, like other industries, has reason to believe that the new administration will offer a kindlier climate for growth. First, it is expected that a sounder fiscal policy will be followed, which will be conducive to a more stabilized economy. Second, it is expected that there will be a trend away from bureaucracy and governmental interference. For a preview of probable legislation affecting the oil industry see **Page 88.**

. . . thunder in the east

MIDDLE EAST OIL . . . spawned in Persia in 1908, it has skyrocketed to the proportions of an overpowering giant today. A powerful force that can serve or subdue the oil industry. Today the area known as the Middle East holds more than 50 percent of the world's proven oil reserves and probably 70 percent of the indicated reserves. The situation in the Middle East could cause a collapse of the industry. What is the answer? Tariffs? An international oil compact? WORLD OIL Publisher Ray L. Dudley and Staffer Robert E. Spann pose some questions and give some answers. **Page 80.** And in the U. S. five oil companies have begun discussions on the touchy Iranian problem. They're hunting a way to return Iran oil to world markets without disturbing the status quo. See **Page 85.**

Use this condensed information on this month's principal articles. Run through these digests rapidly. ✓ Check those you want to read first.

Exploration

Exploration at New Peak. For the second straight year wells drilled in search for new oil and gas have passed the 10,000 mark. The upward exploration trend which started 11 years ago continued during 1952. However there were signs of leveling off. Year's increase in operations over 1951 was a scant margin of 84 wells or 0.8 percent. For a review of 1952, turn to Page 93.

✓

Geophysical Crews. The 741 geophysical and core drilling crews active in U. S. at close of 1952 exceeded the 1951 figure by 110. Comparative activity was higher. It's all summed up on Page 100.

✓

Prospecting Outlook. From California to Kentucky and Utah to the Gulf Coast, what's the prospecting outlook for 1953? For a roundup by WORLD OIL turn to Page 101.

Drilling

46,988 New Wells in '53. That's WORLD OIL's forecast for the U. S. during the coming year. This calls for the drilling of 1103 more wells than the 45,885 drilled in 1952. And a record 190,741,971 feet of hole is predicted—again of 4,342,077 feet or 2.3 percent over the 186,399,894 feet drilled during the past year. For more details on this annual industry forecast, see Page 129.

✓

Completions and Footage. The emphasis during 1952 was on deeper drilling as total new U. S. wells slacked off from 1951's record high. New wells completed in '52 totaled 45,885, 111 fewer than in '51. But footage in '52 was 186,399,894 compared to 176,757,221 in '51. What's the answer to this shift? See Page 132.

✓

Rigs in Operation. Rigs in operation in U. S. during 1952 showed a 0.26 percent gain over 1951 despite the steel shortage near year's end. The year was off with a bang with more than 5000 rigs in operation for the first time in history. Then the full impact of the steel strike hit in July. Activity plunged downward and lagged behind 1951 for the remainder of the year. Page 140.

✓

Contract Drilling. For tenth consecutive year the number of U. S. wells drilled on a contract basis increased in 1952. Contractors accounted for 41,755 of the nation's 45,885 new wells completed. This represented 91 percent of total compared with 90 percent in '51 and 89 percent in '50. And on a footage basis the trend toward contract drilling is even more evident. See Page 142.

✓

Wells Completed. Figures for 1952 show that larger U. S. companies own a decreasingly smaller percentage of wells drilled. Of 45,885 tests completed last year, 10,354 or 22.6 percent, were owned by 22 larger companies which normally produce 60 percent of U. S. oil. Page 144.

✓

Wells Drilled. Number of U. S. wells drilled by rotary method continued to rise during 1952 while total drilled by cable tool slumped back to 1950 level. Of 45,885 new wells completed last year, 37,855 were by rotary method and 8030 by cable tool. Page 144.

✓

Rig Ownership. Big majority of U. S. drilling rigs are owned by contractors. For a breakdown of the figures, see Page 144.

✓

Drilling Depth Records. The world's drilling depth record stood up in 1952. But it was threatened throughout the year by a Mississippi well which began and ended the year just 71 feet short of the record. Last year's area depth records increased to ten from nine the year before. Page 146.

✓

New Drilling Equipment. New and improved equipment helped in the solution of many drilling problems in 1952. How to lower drilling costs? How to dig deeper and faster? For a review of some of the outstanding developments, see Page 152.

Production

Artificial Lift. A net gain of 21,342 is anticipated for 1953 in U. S. oil-producing wells to require some form of artificial lifting. This amounts to just 338 wells less than were placed on artificial lift in 1952. Page 181.

✓

Production Record Falls. U. S. crude production set another record in 1952 and this high mark may be topped again in 1953. This year's output may reach

2310 million barrels. Daily average yield in 1952 was 6,267,800 barrels. Indications are that this may be increased to 6,328,800 in 1953—a rise of 61,000 barrels daily or 0.97 percent. **Page 183.**

√

Natural Gasoline. Production and processing of natural gasoline and allied products last year increased 7.2 percent from 1951 on a daily average yield of 603,429 barrels, up 40,383 barrels. The '52 rise was more than half as great as the 12.9 percent of '51 over '50. Gross production for '52 was 220,855,000 barrels. And a further increase to 231 million barrels is looked for in 1953. **Page 192.**

√

Natural Gas. Records continue to fall in the U. S. natural gas industry. Net gas production up 10.1 percent or 808,059 million cubic feet to 8,775,000 million cubic feet for 1952. Marketed production totaled approximately 8,203,400 million cubic feet, up 10 percent compared with 1951. **Page 194.**

√

Petroleum Reserves. In 1952, the U. S. proved up 4,448,339,000 barrels of new reserves, increasing the nation's reservoir of proved unproduced reserves to 34,093,601,000 barrels, the highest ever. But new oil proved up during 1952 was 689,606,000 barrels less than that added in 1951. **Page 200.**

√

Producing Depth Records. Ten area producing depth records fell in '52. But the world mark remained intact. A well drilled by The Texas Company in Louisiana was completed at 15,362 feet, within 168 feet of the record. **Page 204.**

√

Producing Oil Wells. The 492,426 U. S. oil and condensate wells at the close of 1952 made history. It was a gain of 16,089 or 3.4 percent over 1951. **Page 208.**

√

Refinery Operations. Refinery capacity continued its record expansion in 1952 and crude runs to stills kept pace with a daily average of 6,666,700 barrels. Neither the gain in crude runs nor refinery capacity was as great as in 1951, but came in face of tight materials situation, a serious strike and threat of excessive stocks. **Page 210.**

√

LPG Sales. Continue on upswing. But the rate of increase was less in 1952 than in 1951. Outlook remains bright. **Page 212.**

√

New Production Methods. Increased demand keeps the industry on the lookout for new and better ways of producing and handling oil and gas. Sonic pumps, collapsible rubber tanks, plastic stock tanks, permanent type well completions are a few on the long list of developments during 1952. **Page 217.**

Pipe Line

U. S. Pipe Lines. Increased construction due in 1953. A survey by WORLD OIL indicates that year's end will see 13,910 miles of new pipe in operation. This compares with 13,247 miles in 1952. For a review of the pipe line picture turn to **Page 235.**

International

World Supply and Demand. Increased by mid-1952 to a daily average of 12,137,665 barrels, up 554,932 barrels from the daily average reported for all of 1951. This was a rise of 4.8 percent. West Europe again marked up greatest volume increase in demand outside U. S. China, Formosa, India, Burma, Pakistan and Japan combined to report greatest demand percentage rise for world—43.8 percent. **Page 261.**

√

World Crude Reserve. World crude reserves at beginning of 1953—115,177,701,000 barrels. This was a gain from the same 1952 period of 13,540,720,000 barrels. For more data, see **Page 264.**

√

World Crude Production. There was no leveling off in 1952. Daily average production rose 537,912 barrels—a 4.6 percent jump—to 12,239,752 barrels a day. Forecast in 1953—510,248 barrels-a-day increase to 12,750,000 barrels. For other details and a breakdown of production by countries, see **Page 266.**

√

PAD's Foreign Program. What was the high point of the year for PAD? What was the effect of U. S. steel strikes, the Iran-caused shortages? What are the plans for the coming year . . . the supply situation? J. E. Brantly, assistant deputy administrator of foreign operations, PAD, reviews the past and looks to the coming year. **Page 278.**

√

Efficiency Curbs Costs. Drilling costs are up in Canada but the contractor's income has been maintained due to his ability to increase efficiency of operations. For a timely review of changing trends in drilling costs, with particular emphasis on Western Canada, turn to **Page 286.**

Special Feature

Tulsa Is Ready . . . for the 25,000 visitors expected to visit the International Petroleum Exposition May 14-23. And the word from the host city is that there will be housing for all, thanks to generous Tulsans and the city's hotels. To find out just how big a task this was, see **Page 295.**

Editor's Page

Drilling Costs Too High

DRILLING COSTS have risen so sharply in recent years they may strangle the economic incentive to drill new wells. The industry will not continue to expand drilling in the face of ever greater costs. Meanwhile, higher U. S. producing rates require large scale drilling activity and a special need for extensive wildcatting operations. This makes the problem serious enough to demand attention.

Humble Oil & Refining Company disclosed in its 1951 annual statement how greatly drilling costs have increased. In 1937 Humble spent $28,245,600 in completing 1271 wells at an average cost of $22,200 per well. In 1951 the company spent $105,575,800 in completing 1133 wells at an average cost of $81,500 per well. Thus, total expenditures for drilling and average cost per well were more than 3½ times greater than in 1937. Other companies have had a similar experience.

It costs a great deal more to drill today although contract prices have not advanced. Contractors receive the same rate of revenue as in 1941. Contractors have absorbed higher costs by a 42 percent increase in the rate of penetration achieved through more efficient operations. But if costs go higher, it is doubtful if penetration henceforth will keep pace.

Inflation is an important factor in higher drilling costs. Wages and materials cost more. Increased drilling depths are another factor.

• • •

THE IMPACT of higher drilling costs takes on greater significance because the industry now drills nearly 2½ times as many dry holes as it did 10 years ago, although the number of wells drilled has risen only 1½ times.

Today nearly 40 percent of all the wells drilled in search of production are dry, whereas only 24 percent were dry holes in 1941! Dry holes have risen from 7280 in 1941 when 30,149 wells were drilled, to 17,759 in 1952 when 44,563 wells were completed.

In its 1951 annual statement, Humble showed its dry hole costs comprised 28 percent of its drilling expenditures compared with 10 percent in 1937. Again, other companies have had a similar experience.

• • •

WILDCAT DRILLING operations may be the most promising field for reducing drilling costs. Wildcat wells cost considerably more than field or semi-field wells. This fact takes on significance due to wildcats accounting for a steadily increasing proportion of the industry's drilling activity. In 1941 wildcat operations rose to a then all-time high of 3409 wells, or 11.3 percent of the 30,149 wells drilled in the U. S. in search of production. A sharp and steady growth boosted U. S. wildcatting to 10,084 tests in 1952, or 22.6 percent of all wells drilled for production! Wildcats account for about the same percent of the footage drilled.

To a large extent increased wildcatting is responsible for much of the growth in dry holes, since 85 percent of the wildcats completed are failures.

In view of their higher cost it appears that wildcat wells may account for something like 40 or even 45 percent of total U. S. drilling expenditures. J. Brewster Jennings, president of Socony-Vacuum Oil Company, recently shed some light on the high cost of wildcat drilling. He reported that the average cost of wildcat wells drilled by Magnolia Petroleum Company, a Socony affiliate, increased from $33,000 to $198,000 from 1941 to 1951, while the average depth was rising from 4500 to 7680 feet. Thus, the cost of drilling wildcats rose over six times while the depth was increasing less than two times.

Something must be done about increased drilling costs. If the industry is to maintain adequate oil finding rates it must reduce drilling costs. More footage per dollar spent is needed. Surely the possible benefits are sufficient to warrant spending much time on the matter. Wildcat operations may be the best starting point.

Warren L. Baker

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The Changing Panorama

1952-53

CONDITIONS and operations in the petroleum industry of the U. S. have settled down to a basis closer to normal than in other postwar years. Growth and expansion are continuing but at moderate rates instead of the abnormal, sharply rising rates of some recent years. Shortages are being replaced by sufficiencies. Surpluses of stocks and production are a possibility that must be guarded against. Competition is back in full force, as supplies equal and threaten to exceed demand. U. S. productive capacity has climbed a million barrels a day above current demand.

Prices of oils are steady but likely to seek somewhat different levels when set free by lifting of controls. Some prices may advance, as in the possible case of California crude and derivatives. But price decreases should not be surprising, as gasoline, heavy fuel oil, and lubricants lately have been selling below ceiling prices in some regions.

Daily average demand for domestic crude was only 2 percent greater in 1952 than in 1951, and will further increase only about 1½ percent in 1953, forecasts indicate. Daily average crude runs to stills increased only 2.6 percent in 1952 and will need to rise only 3 percent in 1953. These increases look small in comparison with the sharp rises in crude demand and production and in crude runs to stills amounting to about 13 percent in 1951 and around 7.5 percent in 1950.

Total Demand Up

The slowing down of growth in crude demand reflects the current gentler climb in domestic use of oils as well as further loss of export business. Total demand for all oils rose 3.6 percent in 1952 and will increase 3.5 percent in 1953, on daily average basis, it is indicated. The increase had been approximately 11 percent in 1951 and 10 percent in 1950.

In spite of the continuing shortage of steel pipe, it is indicated that the petroleum industry will increase drilling in 1953 and complete a new record number of wells. WORLD OIL forecasts that 46,988 new wells will be completed. This would be an increase of 1103 wells or 2.4 percent over the 45,885 new wells drilled in 1952 and would also exceed the 45,996 completed in 1951. In the development of 1953, there will be, similarly, a record amount of footage drilled. The forecast indicates 190,741,971 feet of hole to be drilled in the new wells. This would be an increase of 4,342,077 feet or 2.3 percent over the 186,399,894 feet drilled in new wells in 1952.

Wildcatting represents an increasing proportion of drilling. The 10,542 strict wildcats expected to be drilled in 1953 would constitute 22.4 percent of the total new wells predicted. They would show an increase of 458 wildcats or 4.5 percent over the record of 10,084 completed in 1952 and would exceed by 764 wildcats the 9,778 completed in 1951.

The number of drilling rigs in operation may average slightly more in 1953 than in 1952, because of the increase indicated in completions and the amount of footage to be drilled. This means that there should be an increase of a few hundred in the number of rigs operating as the year advances. In 1951 the number of rigs in operation averaged 4844. In 1952 the average increased slightly to 4857, as more footage was drilled, despite a slight decline in completions. Also, the steel strike and pipe shortages caused delays in drilling and held down rig efficiency. The 1952 average was the net result of employing an average of 5066 rigs in the first six months and 4648 in the last six month, with the total at end of the year 4649.

More Contract Wells

The proportion of wells completed on a contract basis further increased in 1952 to 91 percent from 90 percent in 1951 and 89 percent in 1950 and contrasted with only 70 percent in 1942. Contractors in 1952 drilled 41,755 wells, or 91 percent of the 45,885 total new wells completed in the U. S. That was practically twice the number drilled by contractors in 1945, the final year of World II. This shows that the postwar expansion of the contract drilling industry has been even more remarkable than that of the petroleum industry. As might be expected, drilling contractors own a predominant proportion of the drilling rigs in use. Out of about 5400 rigs in the U. S., contractors own about 4600, or 85.2 percent of the total, and the remaining 800 rigs, or 14.8 percent of the total, are owned by producing companies and others.

The 5400 rigs in the U. S. include about 3700 rotary outfits, which are 68.5 percent of the total, and 1700 cable tool units, constituting 31.5 percent of all rigs. Of the 3700 rotaries, 3200 or 86.5 percent are owned by drilling contractors and 500 by others. Of the 1700 cable tool rigs, 1400 or 82.4 percent are owned by contractors and 300 by others.

While rotaries constitute 68.5 percent of all rigs, they drill even higher percentages of the wells and footage drilled. Of the 45,885 new wells completed in 1952, 37,855 or 82.5 percent were drilled by rotary and 8,030 or 17.5 percent by cable tools. While total completions per year have increased greatly since World War II, cable tools have been steadily drilling around 8000 wells

annually, and rotaries have accounted for virtually all of the increase in completions. Thus cable tools have been accounting for a decreasing percentage of total completions and rotaries a sharply increasing percentage. While cable tool completions of 1952 were only 17.5 percent of the total, those of 1945 had been 32.5 percent of all completions. On the other hand, while rotary method completions of 1952 were 82.5 percent of the total, those of 1945 had been only 67.2 percent of total completions.

More Producing Wells

The number of producing oil wells in the U. S. continues to increase, with more new wells being completed than the number being abandoned. At the end of 1952 there were 488,882 producing oil wells in the country, an increase of 12,545 over the 476,377 at end of 1951. This net gain occurred while 23,290 new oil wells were completed, indicating that 10,745 producing oil wells were abandoned or shut in during 1952. As U. S. crude production increased only about 2 percent, while the number of producing wells increased considerably, there

Salient Annual Statistics of the United States

ITEM	THOUSANDS OF BARRELS, EXCEPT AS NOTED				
	1951	1952	Percent Change '51-'52	1953 Forecast	Percent Change '52-'53
Total Demand, All Oils	**2,720,983**	**2,827,641**	**+ 3.9**	**2,920,000**	**+ 3.3**
(Daily Average)	7,455	7,726	+ 3.6	8,000	+ 3.5
Motor Fuel Demand	1,128,325	1,190,260	+ 5.4	1,244,000	+ 4.5
(Daily Average)	3,091	3,252	+ 5.2	3,408	+ 4.8
Kerosene Demand	128,084	131,929	+ 3.0	136,000	+ 3.1
(Daily Average)	351	360	+ 2.6	373	+ 3.6
Residual Fuel Oil Demand	592,905	580,227	— 2.1	585,000	+ 0.8
(Daily Average)	1,624	1,585	— 2.4	1,603	+ 1.1
Distillate Fuel Oil Demand	469,990	511,862	+ 8.9	542,000	+ 5.9
(Daily Average)	1,288	1,398	+ 8.5	1,485	+ 6.2
Lubricating Oils Demand	59,721	55,329	— 7.4	56,000	+ 1.2
(Daily Average)	164	151	— 7.9	153	+ 1.3
Domestic Demand, Total	**2,566,555**	**2,673,671**	**+ 4.2**	**2,791,000**	**+ 4.4**
(Daily Average)	7,032	7,305	+ 3.9	7,647	+ 4.7
Exports, Total	**154,428**	**153,970**	**— 0.3**	**129,000**	**—16.2**
(Daily Average)	423	421	— 0.5	353	—16.2
Crude Oil Exports	28,604	25,506	—10.8	22,000	—13.8
(Daily Average)	78	70	—10.3	60	—14.3
Refined Oil Exports	125,824	128,464	+ 2.1	107,000	—16.7
(Daily Average)	345	351	+ 1.7	293	—16.5
Crude Runs to Stills, Total	**2,370,404**	**2,440,003**	**+ 2.9**	**2,505,000**	**+ 2.7**
(Daily Average)	6,494	6,666	+ 2.6	6,863	+ 3.0
Demand for Crude, Total	**2,416,282**	**2,490,562**	**+ 3.1**	**2,544,000**	**+ 2.1**
(Daily Average)	6,620	6,805	+ 2.8	6,970	+ 2.4
Demand for Domestic Crude	2,234,123	2,284,084	+ 2.2	2,310,000	+ 1.1
(Daily Average)	6,121	6,241	+ 2.0	6,329	+ 1.4
Crude Oil Production	**2,244,529**	**2,294,016**	**+ 2.2**	**2,310,000**	**+ 0.7**
(Daily Average)	6,149	6,268	+ 1.9	6,329	+ 1.0
Value at Wells, $ Thousand	5,656,213	5,780,920	+ 2.2	5,821,200	+ 0.7
Average Value, $ Barrel	2.52	2.52	.....	2.52	.....
Imports, All Oils	**307,721**	**343,926**	**+13.4**	**379,000**	**+ 8.6**
(Daily Average)	843	953	+13.0	1,038	+ 8.9
Crude Petroleum Imports	179,073	209,228	+16.8	234,000	+11.8
(Daily Average)	491	571	+16.3	641	+12.3
Refined Products Imports	128,648	139,698	+ 8.6	145,000	+ 3.8
(Daily Average)	352	382	+ 8.5	397	+ 3.9
Stocks End of Year All Oils	**634,109**	**670,656**	**+ 5.8**	**670,656**	.....
Crude Oil Stocks	255,783	268,465	+ 5.0	268,465	.....
Natural Gasoline Stocks	8,186	8,335	+ 1.8	8,335	.....
Refined Products Stocks	370,140	393,856	+ 6.4	393,856	.....
Motor Fuel Stocks	135,306	136,695	+ 1.0	136,695	.....
Kerosene Stocks	27,088	27,490	+ 1.5	27,490	.....
Residual Fuel Oil Stocks	42,853	49,117	+14.6	49,117	.....
Distillate Fuel Oil Stocks	86,619	101,843	+17.6	101,843	.....
Lubricating Oil Stocks	9,617	10,500	+ 9.2	10,500	.....

was a slight drop in average daily production per well to 13.0 barrels in 1952 from 13.1 barrels in 1951.

Proved crude reserves in the U. S. should go for the first time above 30 billion barrels in 1953. They reached 29 billion barrels at the end of 1952, WORLD OIL estimates. A current total of 29,020,601,000 barrels is indicated by estimates that about 3,814,839,000 barrels of new reserves were proved up, while 2,262,269,000 barrels were produced, leaving a net gain of 1,552,570,000 barrels to be added to the 27,468,031,000 barrels of reserves at end of 1951.

Proved reserves of natural gas liquids went above 5 billion barrels in 1952. They are estimated at 5073 million barrels at the end of 1952, a net increase of 348,398,000 barrels over the 4,724,602,000 barrels at the end of 1951, as about 633,500,000 barrels of new reserves were proved up in 1952, while the year's production was 285,102,000 barrels.

Combined crude and natural gas liquid reserves thus stand now at 34 billion barrels and should go above 35 billion in 1953. The present reserves are about 13 times as great as current production, about the same ratio as in other postwar years.

Salient Annual Statistics of the United States

ITEM	NUMBER, EXCEPT AS NOTED				
	1951	1952	Percent Change '51-'52	1953 Forecast	Percent Change '52-'53
Natural Gasoline Production, Thousand Bbls.	**205,512**	**220,855**	**+ 7.5**	**231,000**	**+ 4.6**
(Daily Average)	563	603	+ 7.1	633	+ 4.9
Nat'l Gas Marketed Production, Bln. Cu. Ft.	**7,457**	**8,203**	**+ 10.0**	**9,000**	**+ 9.7**
Value at Consumpt'n Points, ¢ per M. Cu. Ft.	29.8	31.0	+ 4.0	32.0	+ 3.2
Value at Wells, ¢ per M. Cu. Ft.	7.3	7.4	+ 1.4	7.5	+ 1.4
Pipe Line Construction, Miles	**16,628**	**13,247**	**+ 4.9**	.....	.....
Oil Lines Completed, Miles	1,929	4,363	+126.2	.....	.....
Gas Lines Completed, Miles	8,946	7,188	— 19.7	.....	.....
Product Lines Completed, Miles	1,753	1,696	— 3.3	.....	.....
Crude Reserves, Year-End, Million Bbls.	**27,468**	**29,021**	**+ 5.6**	**30,500**	**+ 5.1**
New Crude Reserves Proved, Million Bbls.	**4,414**	**3,815**	**— 13.6**	**3,789**	— 0.7
New Fields and Pays Found	**1,662**	**1,624**	**— 2.3**	.....	.....
New Oil Discoveries	**1,350**	**1,284**	**— 4.9**	.....	.....
New Fields	992	984	— 0.8	.....	.....
New Pays	358	300	— 16.2	.....	.....
New Gas Discoveries	**89**	**208**	**+133.7**	.....	.....
New Fields	62	166	+167.7	.....	.....
New Pays	27	42	+ 55.6	.....	.....
New Distillate Discoveries	**223**	**132**	**— 40.8**	.....	.....
New Fields	172	110	— 36.1	.....	.....
New Pays	51	22	— 56.9	.....	.....
Strict Wildcats Drilled	**9,778**	**10,084**	**+ 3.1**	**10,542**	**+ 4.5**
Productive	1,226	1,260	+ 2.8	.....	.....
Non-Productive	8,552	8,824	+ 3.2	.....	.....
Well Completions, Total	**46,766**	**46,412**	**— 0.8**	.....	.....
New Wells, Total	45,996	45,885	— 0.2	46,988	+ 2.4
Oil Wells	23,532	23,290	— 1.0	.....	.....
Gas Wells	3,198	3,166	— 1.0	.....	.....
Distillate Wells	344	348	+ 1.2	.....	.....
Dry Holes	17,497	17,759	+ 1.5	.....	.....
Gas Input Wells	35	99	+182.9	.....	.....
Water Input Wells	1,323	1,161	— 12.3	.....	.....
Water Disposal Wells	67	62	— 7.5	.....	.....
Old Wells, Drilled Deeper	770	527	— 31.6	.....	.....
Footage Drilled, Thousand Feet	**177,421**	**186,868**	**+ 5.3**	.....	.....
Footage Drilled, New Wells, Thousand Feet	176,757	186,400	+ 5.5	190,742	+ 2.3
Wells Drilling, End of Year	**5,182**	**4,649**	**— 10.3**	.....	.....
Producing Oil Wells, End of Year	**476,337**	**488,882**	**+ 2.6**	.....	.....
Flowing Oil Wells	55,513	57,349	+ 3.3	.....	.....
Pumping Oil Wells	420,824	431,533	+ 2.5	.....	.....

Petroleum Demand

Is for 1 Percent More Crude

By L. J. LOGAN, WORLD OIL Staff

A SLIGHT increase of 1 percent in daily average domestic crude production will be required in 1953, following the small gain of 1.9 percent in output in 1952. U. S. producers will have a market for 6,329,000 barrels of crude per day in 1953. This is the U. S. Bureau of Mines calculation, based on its annual forecast of demand for petroleum and products.

This indicated volume of crude production to be needed would be 61,000 barrels per day or 1.0 percent more than the actual output of 6,268,000 daily in 1952.

The increase in requirements for domestic crude production will be somewhat less than the gain in total demand for all oils, which will amount to 3.5 percent, on a daily average basis. The need for domestic crude will be up less than that for several reasons. In the first place, no net increase in stocks of crude or products is projected for 1953, whereas 1952 production included 100,000 barrels a day that went into crude and refined product storage—35,000 a day of crude and 65,000 daily of products.

In the second place, demand for oils will be met in an increased proportion by natural gasoline, with daily production of that commodity expected to be up 4.8 percent in comparison with the smaller gain for crude. Natural gasoline output of 633,000 barrels daily, as forecast, would be 29,000 barrels a day greater than in 1952.

Finally, an increased percentage of the demand for oils probably will be supplied by imports in 1953, following the substantial rise of imports in 1952. For 1953 it is predicted that total imports will average 1,038,000 barrels daily, an increase of 85,000 a day or 8.9 percent over the 953,000

Demand for All Oils

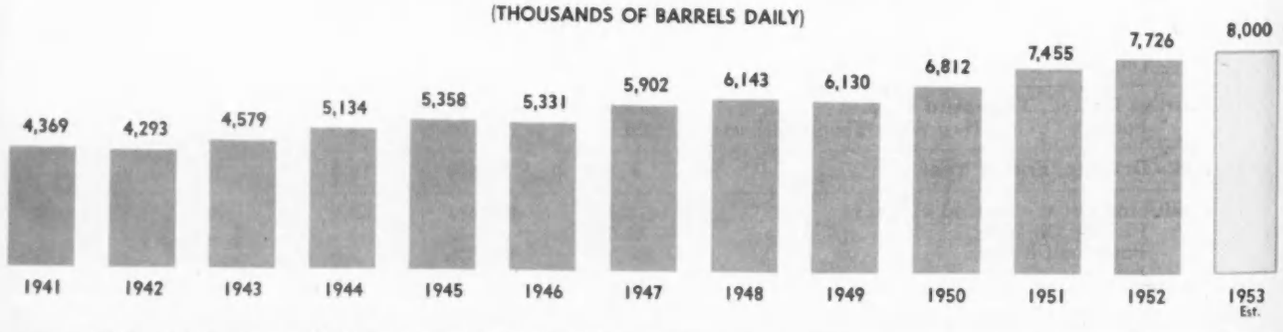
(All Figures in Barrels)

YEAR	TOTAL (Domestic and Export)		DOMESTIC		EXPORTS	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	.....	.....	.....	.....	.....	.....
1919	438,434,000	1,201,200	374,541,000	1,026,100	63,893,000	175,100
1920	535,382,000	1,462,800	456,764,000	1,245,300	79,618,000	217,500
1921	592,402,000	1,450,400	457,521,000	1,253,300	71,881,000	196,900
1922	605,540,000	1,659,000	530,990,000	1,454,800	74,550,000	204,200
1923	754,361,000	2,066,700	652,027,000	1,786,400	102,334,000	280,300
1924	805,070,000	2,199,600	687,742,000	1,879,100	117,328,000	320,500
1925	840,818,000	2,303,600	726,797,000	1,991,200	114,021,000	312,400
1926	912,893,000	2,501,100	780,487,000	2,138,300	132,406,000	362,800
1926	944,762,000	2,588,400	802,499,000	2,198,600	142,263,000	389,800
1928	1,014,716,000	2,772,400	859,759,000	2,349,000	154,957,000	423,400
1929	1,103,203,000	3,022,500	940,083,000	2,575,600	163,120,000	446,900
1930	1,083,511,000	2,968,500	927,016,000	2,539,800	156,495,000	428,700
1931	1,027,274,000	2,814,500	902,920,000	2,473,800	124,354,000	340,700
1932	938,757,000	2,564,900	835,482,000	2,282,700	103,275,000	282,200
1933	975,214,000	2,671,800	868,487,000	2,379,400	106,727,000	292,400
1934	1,034,672,000	2,834,700	920,165,000	2,521,000	114,507,000	313,700
1935	1,112,672,000	3,048,400	983,685,000	2,695,000	128,987,000	353,400
1936	1,224,748,000	3,346,300	1,092,754,000	2,985,700	131,994,000	360,600
1937	1,342,516,000	3,678,100	1,169,682,000	3,204,600	172,834,000	473,500
1938	1,330,850,000	3,646,200	1,137,122,000	3,115,400	193,728,000	530,800
1939	1,420,035,000	3,890,500	1,231,067,000	3,372,800	188,959,000	517,700
1940	1,457,086,000	3,981,100	1,326,620,000	3,624,600	130,466,000	356,500
1941	1,594,609,000	4,368,800	1,485,779,000	4,070,600	108,830,000	298,200
1942	1,566,815,000	4,292,600	1,449,908,000	3,972,300	116,907,000	320,300
1943	1,671,383,000	4,579,100	1,521,426,000	4,168,300	149,957,000	410,800
1944	1,878,879,000	5,133,600	1,671,263,000	4,566,300	207,616,000	567,300
1945	1,955,668,000	5,358,000	1,772,685,000	4,856,700	182,983,000	501,300
1946	1,945,909,000	5,331,200	1,792,786,000	4,911,700	153,123,000	419,500
1947	2,154,280,000	5,902,100	1,989,803,000	5,451,500	164,477,000	450,600
1948	2,248,352,000	6,143,000	2,113,678,000	5,775,100	134,674,000	368,000
1949	2,237,626,000	6,130,500	2,118,250,000	5,803,400	119,376,000	327,100
1950	2,486,363,000	6,811,900	2,375,057,000	6,507,000	111,306,000	304,900
1951	2,720,983,000	7,454,700	2,566,555,000	7,031,600	154,428,000	423,100
1952	2,827,641,000	7,725,800	2,673,671,000	7,305,100	153,970,000	420,700
*1953	2,920,000,000	8,000,000	2,791,000,000	7,646,600	129,000,000	353,400

Source: U. S. Bureau of Mines, except November and December, 1952, estimated with aid of A.P.I. Reports. * Forecast.

DEMAND FOR ALL UNITED STATES OILS

(THOUSANDS OF BARRELS DAILY)



U. S. Petroleum Supply and Demand

Thousands of Barrels Daily

YEAR	SUPPLY			Change in Stocks	DEMAND		
	U.S. Prod. All Oils[1]	Total Imports[2]	Total New Supply	All Oils[3]	Domestic Demand[4]	Exports and Shipments[5]	Total Demand
1936	3,128	156	3,284	—62	2,986	360	3,346
1937	3,647	157	3,804	+126	3,205	473	3,678
1938	3,472	149	3,621	—25	3,115	531	3,646
1939	3,614	162	3,776	—115	3,373	518	3,891
1940	3,858	229	4,087	+106	3,625	356	3,981
1941	4,073	266	4,339	—30	4,071	298	4,369
1942	4,034	99	4,133	—160	3,972	321	4,293
1943	4,372	174	4,546	—33	4,168	411	4,579
1944	4,864	252	5,116	—17	4,562	571	5,133
1945	5,010	311	5,321	—37	4,857	501	5,358
1946	5,073	377	5,450	+119	4,912	419	5,331
1947	5,451	437	5,888	—14	5,451	451	5,902
1948	5,921	514	6,435	+292	5,775	368	6,143
1949	5,477	645	6,122	—8	5,803	327	6,130
1950	5,906	850	6,756	—55	6,507	304	6,811
1951	6,713	843	7,556	+101	7,032	423	7,455
1952	6,872	953	7,825	+100	7,305	421	7,726
1953 Estimate	6,962	1,038	8,000	.....	7,647	353	8,000

[1] Includes crude oil, natural gasoline, related products, and benzol. [2] Includes both refined and crude oils. [3] Includes changes in both refined and crude oil stocks. Minus signs indicate decreases and plus signs increases. [4] Includes military and civilian demand in continental United States and shipments to U. S. armed forces abroad. [5] Includes shipments to non-contiguous territories.

Source: Data from U. S. Bureau of Mines, except November and December, 1952, estimated by WORLD OIL.

daily of 1952, and comparing with 843,000 daily in 1951.

The estimated imports of 1953 would supply 13.0 percent of the total demand for all oils, whereas the actual imports of 1952 supplied 12.3 percent of the demand. Daily average imports of crude will be up 70,000 barrels daily or 12.3 percent to 641,000 daily in 1953, it is forecast, and imports of refined products will be up 15,000 daily or 3.9 percent to 397,000 pounds per day.

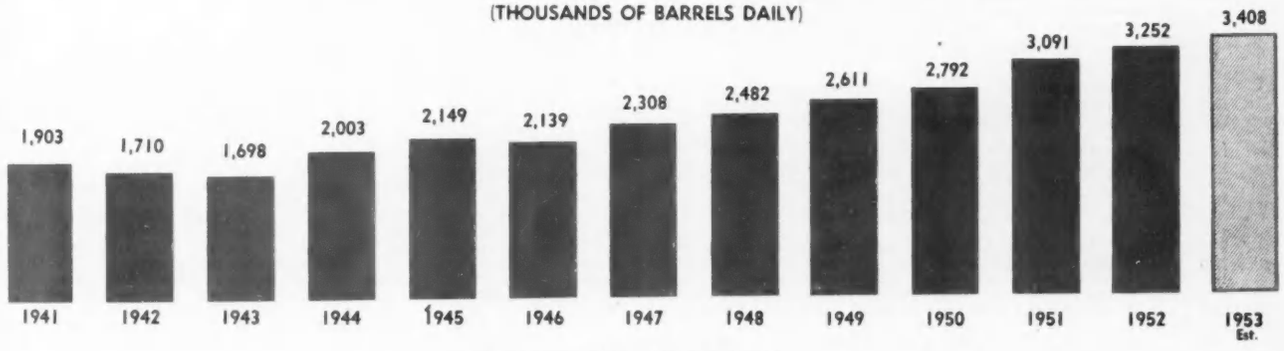
Crude runs to stills to be required in 1953 will average 6,863,000 barrels daily in 1952. This increase will be a 3.0 percent over the runs of 6,666,000 daily, an increase of 197,000 barrels or little smaller than the 3.5 percent gain in total demand for all oils because of not repeating the 1952 expansion of refined product stocks, more production of natural gasoline, and slightly higher imports of refined products.

The above described market outlook for U. S. crude is indicated by Bureau of Mines estimates of domestic and export demand for the various petroleum products, including motor fuel, kerosine, distillate fuel oil, residual fuel oil, lubricants, and other items.

Total demand for all oils will aver-

DEMAND FOR UNITED STATES MOTOR FUEL

(THOUSANDS OF BARRELS DAILY)



Demand for Motor Fuel

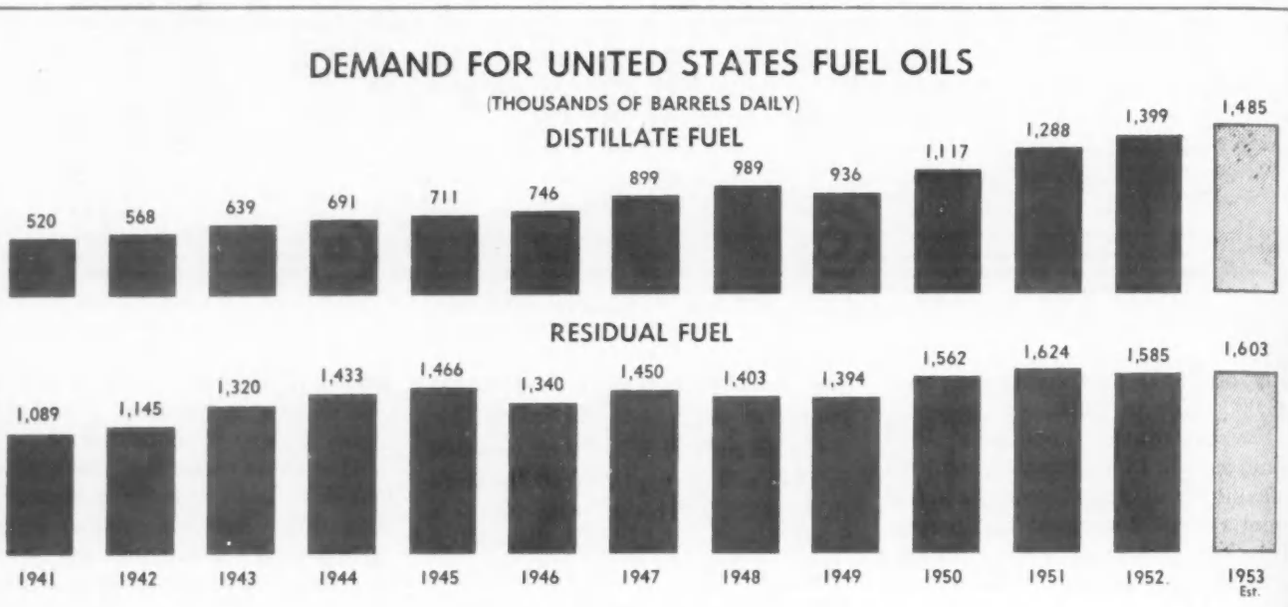
(All Figures in Barrels)

YEAR	TOTAL (Domestic and Export)		DOMESTIC		EXPORTS	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	93,599,000	256,400	79,949,000	219,000	13,650,000	37,000
1919	97,790,000	267,900	88,648,000	242,900	9,142,000	25,000
1920	124,623,000	340,500	108,945,000	297,700	15,678,000	42,800
1921	130,203,000	356,700	116,840,000	320,100	13,363,000	36,600
1922	152,132,000	416,800	137,770,000	377,500	14,362,000	39,300
1923	195,556,000	535,800	174,462,000	478,000	21,094,000	57,800
1924	225,737,000	616,800	196,586,000	537,100	29,151,000	79,700
1925	264,429,000	724,500	232,745,000	637,700	31,684,000	86,800
1926	311,897,000	854,500	268,128,000	734,600	43,769,000	119,900
1926	350,318,000	959,800	305,367,000	836,600	44,951,000	123,200
1928	392,293,000	1,071,800	338,881,000	925,900	53,412,000	145,900
1929	444,937,000	1,219,000	382,878,000	1,049,000	62,059,000	170,000
1930	463,184,000	1,269,000	397,609,000	1,089,300	65,575,000	179,700
1931	453,559,000	1,242,600	407,843,000	1,117,400	45,716,000	125,200
1932	413,229,000	1,129,000	377,791,000	1,032,200	35,438,000	96,800
1933	409,815,000	1,122,800	380,494,000	1,042,500	29,321,000	80,300
1934	435,025,000	1,191,800	410,339,000	1,124,200	24,686,000	67,600
1935	465,423,000	1,275,100	434,810,000	1,191,200	30,613,000	83,900
1936	510,252,000	1,394,100	481,606,000	1,315,800	28,646,000	78,300
1937	557,658,000	1,527,800	519,352,000	1,422,900	38,306,000	104,900
1938	573,112,000	1,570,200	523,003,000	1,432,900	50,109,000	137,300
1939	600,147,000	1,644,200	555,509,000	1,521,900	44,638,000	122,300
1940	614,867,000	1,679,900	589,490,000	1,610,600	25,377,000	69,300
1941	694,588,000	1,903,000	667,505,000	1,828,800	27,083,000	74,200
1942	624,207,000	1,710,200	589,110,000	1,614,000	35,097,000	96,200
1943	619,815,000	1,698,100	568,238,000	1,556,800	51,577,000	141,300
1944	733,019,000	2,002,800	632,482,000	1,728,100	100,537,000	274,700
1945	784,392,000	2,149,000	696,333,000	1,907,800	88,059,000	241,200
1946	780,751,000	2,139,000	735,417,000	2,014,800	45,334,000	124,200
1947	842,464,000	2,308,100	795,015,000	2,178,100	47,449,000	130,000
1948	908,572,000	2,482,400	871,270,000	2,380,500	37,302,000	101,900
1949	953,060,000	2,611,100	913,713,000	2,503,300	39,347,000	107,800
1950	1,019,011,000	2,791,800	994,290,000	2,724,100	24,721,000	67,700
1951	1,128,325,000	3,091,300	1,087,969,000	2,980,700	40,356,000	110,600
1952	1,190,260,000	3,252,100	1,157,277,000	3,162,000	32,983,000	90,100
*1953	1,244,000,000	3,408,200	1,214,000,000	3,326,000	30,000,000	82,200

Source: U. S. Bureau of Mines, except November and December, 1952, estimated with aid of A.P.I. reports. * Forecast.

age 8 million barrels daily in 1953, an increase of 274,000 barrels per day or 3.5 percent over the 7,726,000 daily of 1952, according to the forecast. This increase would be about the same as that in 1952 over 1951. The 1952 demand was 271,000 barrels daily or 3.5 percent above the 7,455,000 daily of 1951.

The gain in total demand will be held down by further loss of export business, which showed a nominal de-



Demand for United States Fuel Oils

(All Figures in Barrels)

YEAR	TOTAL DEMAND (Domestic and Export) Annual Total	TOTAL DEMAND (Domestic and Export) Daily Average	DOMESTIC DEMAND Annual Total	DOMESTIC DEMAND Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
* All Fuel Oils (Distillate and Residual)						
1918	172,387,000	472,300	142,751,000	391,100	29,636,000	81,200
1919	180,290,000	494,000	163,803,000	448,800	16,487,000	45,200
1920	208,052,000	568,400	185,972,000	508,100	22,080,000	60,300
1921	218,332,000	598,100	195,656,000	536,000	22,676,000	62,100
1922	255,542,000	700,100	237,063,000	649,500	18,479,000	50,600
1923	294,760,000	807,500	261,388,000	716,100	33,372,000	91,400
1924	328,015,000	896,200	290,766,000	794,400	37,249,000	101,800
1925	343,092,000	940,000	307,004,000	841,100	36,088,000	98,900
1926	377,923,000	1,035,400	339,572,000	930,300	38,351,000	105,100
1927	386,656,000	1,059,300	339,265,000	929,500	47,391,000	129,800
1928	428,401,000	1,170,500	383,974,000	1,049,100	44,427,000	121,400
1929	454,307,000	1,244,700	415,156,000	1,137,400	39,151,000	107,300
1930	404,981,000	1,109,600	368,531,000	1,009,700	36,450,000	99,900
1931	363,899,000	997,000	334,668,000	916,900	29,231,000	80,100
1932	324,151,000	885,600	304,157,000	831,000	19,994,000	54,600
1933	344,268,000	943,200	323,705,000	886,900	20,563,000	56,300
1934	368,976,000	1,010,900	340,371,000	932,500	28,605,000	78,400
1935	395,671,000	1,084,000	366,723,000	1,004,700	28,948,000	79,300
1936	445,524,000	1,217,300	410,641,000	1,122,000	34,883,000	95,300
1937	487,788,000	1,336,400	442,355,000	1,211,900	45,433,000	124,500
1938	456,843,000	1,251,600	409,282,000	1,121,300	47,561,000	130,300
1939	507,966,000	1,391,700	458,461,000	1,256,100	49,505,000	135,600
1940	536,263,000	1,465,200	501,014,000	1,368,900	35,249,000	96,300
1941	587,285,000	1,609,000	556,246,000	1,524,000	31,039,000	85,000
1942	625,028,000	1,712,400	591,358,000	1,620,200	33,670,000	92,200
1943	714,969,000	1,958,800	675,118,000	1,849,600	39,851,000	109,200
1944	777,367,000	2,124,000	721,340,000	1,970,900	56,027,000	153,100
1945	794,672,000	2,177,200	749,507,000	2,053,500	45,165,000	123,700
1946	761,598,000	2,086,600	722,923,000	1,980,600	38,675,000	106,000
1947	857,283,000	2,348,700	816,783,000	2,237,800	40,500,000	110,900
1948	875,423,000	2,391,900	841,119,000	2,298,100	34,304,000	93,700
1949	850,235,000	2,329,400	825,299,000	2,261,100	24,936,000	68,300
1950	977,559,000	2,678,300	948,678,000	2,599,100	28,881,000	79,200
1951	1,062,895,000	2,912,000	1,011,163,000	2,770,300	51,732,000	141,700
1952	1,092,089,000	2,983,900	1,031,073,000	2,817,100	61,016,000	166,800
1953 Est.	1,127,000,000	3,087,700	1,082,000,000	2,964,400	45,000,000	123,300

YEAR	TOTAL DEMAND (Domestic and Export) Annual Total	TOTAL DEMAND (Domestic and Export) Daily Average	DOMESTIC DEMAND Annual Total	DOMESTIC DEMAND Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
Distillate Fuel Oil						
1932	73,883,000	201,900	65,101,000	177,900	8,782,000	24,000
1933	76,172,000	208,700	64,748,000	177,400	11,424,000	31,300
1934	89,330,000	244,700	74,824,000	205,000	14,506,000	39,700
1935	102,277,000	280,200	86,028,000	235,700	16,249,000	44,500
1936	123,205,000	336,600	102,757,000	280,800	20,448,000	55,800
1937	146,970,000	402,600	116,841,000	320,100	30,129,000	82,500
1938	147,090,000	403,000	117,449,000	321,800	29,641,000	81,200
1939	166,993,000	457,500	134,973,000	369,800	32,020,000	87,700
1940	179,991,000	491,800	160,851,000	439,500	19,140,000	52,300
1941	189,749,000	519,900	172,824,000	473,500	16,925,000	46,400
1942	207,236,000	567,700	185,661,000	508,600	21,575,000	59,100
1943	233,067,000	638,600	208,110,000	570,200	24,957,000	68,400
1944	252,811,000	690,700	209,320,000	571,900	43,491,000	118,800
1945	259,580,000	711,100	226,084,000	619,400	33,496,000	91,700
1946	272,381,000	746,300	242,894,000	665,500	29,487,000	80,800
1947	328,150,000	899,000	298,273,000	817,200	29,877,000	81,800
1948	361,869,000	988,700	340,576,000	930,500	21,293,000	58,200
1949	341,573,000	935,800	329,278,000	902,100	12,295,000	33,700
1950	407,538,000	1,116,600	394,885,000	1,081,900	12,653,000	34,700
1951	469,990,000	1,287,600	447,316,000	1,225,500	22,674,000	62,100
1952	511,862,000	1,398,500	479,892,000	1,311,100	31,970,000	87,400
1953 Est.	542,000,000	1,485,000	518,000,000	1,419,200	24,000,000	65,800
Residual Fuel Oil						
1932	250,268,000	683,800	239,056,000	653,200	11,212,000	30,600
1933	268,096,000	734,500	258,957,000	709,500	9,139,000	25,000
1934	279,646,000	766,100	265,547,000	727,500	14,099,000	38,600
1935	293,394,000	803,800	280,695,000	769,000	12,699,000	34,800
1936	322,319,000	880,700	307,884,000	841,200	14,435,000	39,500
1937	340,818,000	933,700	325,514,000	891,800	15,304,000	41,900
1938	309,753,000	848,600	291,833,000	799,500	17,920,000	49,100
1939	340,973,000	934,200	323,488,000	886,300	17,485,000	47,900
1940	356,272,000	973,400	340,163,000	929,400	16,109,000	44,000
1941	397,536,000	1,089,100	383,422,000	1,050,400	14,114,000	38,700
1942	417,792,000	1,144,600	405,697,000	1,111,500	12,095,000	33,100
1943	481,902,000	1,320,300	467,008,000	1,279,500	14,894,000	40,800
1944	524,556,000	1,433,200	512,020,000	1,399,000	12,536,000	34,200
1945	535,092,000	1,466,000	523,423,000	1,434,000	11,669,000	32,000
1946	489,217,000	1,340,300	480,029,000	1,315,100	9,188,000	25,200
1947	529,133,000	1,449,700	518,510,000	1,420,600	10,623,000	29,100
1948	513,554,000	1,403,200	500,543,000	1,367,600	13,011,000	35,500
1949	508,662,000	1,393,600	496,021,000	1,359,000	12,641,000	34,600
1950	570,021,000	1,561,700	553,793,000	1,517,200	16,228,000	44,500
1951	592,905,000	1,624,400	563,847,000	1,544,800	29,058,000	79,600
1952	580,227,000	1,585,400	551,181,000	1,506,000	29,046,000	79,400
1953 Est.	585,000,000	1,602,700	564,000,000	1,545,200	21,000,000	57,500

* Breakdown of fuel oils by distillates and residual grades not available prior to 1932; but breakdown for 1932 and subsequent years appears at right.

Source: U. S. Bureau of Mines, except November and December, 1952, estimated with aid of A.P.I. reports.

crease the past year. Domestic demand for all oils will be 4.7 percent larger in 1953 than in 1952, on daily average basis, following the increase of 3.9 percent in 1952 over 1951. These increases of around 4 percent per year for 1952 and 1953 are about average for the industry on a long-term basis, although smaller than for some of the recent booming postwar years. Of the 8 million barrels per day of total demand for all oils forecast for 1953, domestic requirements will account for 7,647,000 daily or 95.6 percent. Exports, consisting mostly of refined products, will constitute the remainder of 353,000 barrels daily or only 4.4 percent of the total demand. For exports this would be a decrease of 68,000 barrels daily or 16.2 percent from 1952, compared with only a nominal decline of 2000 barrels per day or ½ of 1 percent in 1952 from 1951. Both crude and refined oil exports are expected to be lower in 1953.

Total demand for motor fuel will increase 4.8 percent in 1953 after rising 5.2 percent in 1952, on daily averages. But the domestic component of demand will be up 5.2 percent, after

Forecast of Petroleum Demand and Supply in 1953, Compared with 1952 and 1951

All data from U. S. Bureau of Mines except November and December, 1952, estimated with aid of A.P.I. statistical bulletins.

(THOUSANDS OF BARRELS)

	ANNUAL COMPARISONS					1953 FORECAST BY QUARTERS			
	1951	1952	% Diff. '51-'52	1953 Forecast	% Diff. '52-'53	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
DEMAND									
All Oils, Total Demand	**2,720,983**	**2,827,641**	**+ 3.9**	**2,920,000**	**+ 3.3**	**767,000**	**685,000**	**687,000**	**781,000**
(Daily Average)	7,455	7,726	+ 3.6	**8,000**	+ 3.5	8,522	7,527	7,467	8,489
Domestic Demand	2,566,555	2,673,671	+ 4.2	**2,791,000**	+ 4.4	732,000	650,000	656,000	753,000
(Daily Average)	7,032	7,305	+ 3.9	**7,647**	+ 4.7	8,133	7,143	7,130	8,185
Exports, Total	154,428	153,970	— 0.3	**129,000**	— 16.2	35,000	35,000	31,000	28,000
(Daily Average)	423	421	— 0.5	**353**	— 16.2	389	384	337	304
Crude Exports	28,604	25,506	— 10.8	**22,000**	— 13.8	6,000	6,000	5,000	5,000
(Daily Average)	78	70	— 10.3	**60**	— 14.3	67	66	54	54
Refined Exports	125,824	128,464	+ 2.1	**107,000**	— 16.7	29,000	29,000	26,000	23,000
(Daily Average)	345	351	+ 1.7	**293**	— 16.5	322	318	283	250
Motor Fuel, Total Demand	**1,128,325**	**1,190,260**	**+ 5.4**	**1,244,000**	**+ 4.5**	**275,000**	**324,000**	**332,000**	**313,000**
(Daily Average)	3,091	3,252	+ 5.2	**3,408**	+ 4.8	3,056	3,560	3,609	3,402
Domestic Demand	1,087,969	1,157,277	+ 6.4	**1,214,000**	+ 4.9	267,000	316,000	325,000	306,000
(Daily Average)	2,981	3,162	+ 6.1	**3,326**	+ 5.2	2,967	3,473	3,533	3,326
Exports	40,356	32,983	— 18.3	**30,000**	— 9.1	8,000	8,000	7,000	7,000
(Daily Average)	110	90	— 18.2	**82**	— 8.9	89	87	76	76
Kerosine, Total Demand	**128,084**	**131,929**	**+ 3.0**	**136,000**	**+ 3.1**	**47,000**	**22,000**	**22,000**	**45,000**
(Daily Average)	351	360	+ 2.6	**373**	+ 3.6	522	242	239	489
Domestic Demand	121,266	123,882	+ 2.2	**130,000**	+ 4.9	45,000	20,500	20,500	44,000
(Daily Average)	332	338	+ 1.8	**356**	+ 5.3	500	225	223	478
Exports	6,818	8,047	+ 18.0	**6,000**	— 25.4	2,000	1,500	1,500	1,000
(Daily Average)	19	22	+ 15.8	**17**	— 22.7	22	17	16	11
Distillate Fuel Oil, Total Demand	**469,990**	**511,862**	**+ 8.9**	**542,000**	**+ 5.9**	**184,000**	**101,000**	**93,000**	**164,000**
(Daily Average)	1,288	1,398	+ 8.5	**1,485**	+ 6.2	2,044	1,110	1,011	1,783
Domestic Demand	447,316	479,872	+ 7.3	**518,000**	+ 7.9	178,000	94,000	87,000	159,000
(Daily Average)	1,226	1,311	+ 6.9	**1,419**	+ 8.2	1,978	1,033	946	1,728
Exports	22,674	31,970	+ 41.1	**24,000**	— 24.9	6,000	7,000	6,000	5,000
(Daily Average)	62	87	+ 40.3	**66**	— 24.1	66	77	65	55
Residual Fuel Oil, Total Demand	**592,905**	**580,227**	**— 2.1**	**585,000**	**+ 0.8**	**166,000**	**136,000**	**126,000**	**157,000**
(Daily Average)	1,624	1,585	— 2.4	**1,603**	+ 1.1	1,844	1,495	1,370	1,706
Domestic Demand	563,847	551,181	— 2.3	**564,000**	+ 2.3	160,000	130,000	121,000	153,000
(Daily Average)	1,545	1,506	— 2.5	**1,545**	+ 2.6	1,778	1,429	1,315	1,663
Exports	29,058	29,046	— 0.1	**21,000**	— 27.7	6,000	6,000	5,000	4,000
(Daily Average)	79	79	.....	**58**	— 26.6	66	66	55	43
***All Other Oils, Total Demand**	**401,679**	**413,363**	**+ 2.9**	**413,000**	**— 0.1**	**95,000**	**102,000**	**114,000**	**102,000**
(Daily Average)	1,100	1,130	+ 2.7	**1,132**	+ 0.2	1,055	1,121	1,239	1,109
Domestic Demand	346,157	361,459	+ 4.4	**365,000**	+ 1.0	82,000	89,500	102,500	91,000
(Daily Average)	948	988	+ 4.2	**1,000**	+ 1.2	911	984	1,114	989
Exports	55,522	51,924	— 6.5	**48,000**	— 7.5	13,000	12,500	11,500	11,000
(Daily Average)	152	142	— 6.6	**132**	— 7.0	144	137	125	120
CHANGE IN STOCKS									
All Oils	**+36,991**	**+36,547**	.....	.....	.....	**—35,000**	**+29,000**	**+35,000**	**—29,000**
(Daily Average)	+101	+100	.....	.....	.....	.....	.....	.....	.....
Crude Oil	+7,320	+12,682	.....	.....	.....	.....	.....	.....	.....
(Daily Average)	+20	+35	.....	.....	.....	.....	.....	.....	.....
Natural Gasoline	+831	+149	.....	.....	.....	.....	.....	.....	.....
(Daily Average)	+2	.....	.....	.....	.....	.....	.....	.....	.....
Refined Products	+28,840	+23,716	.....	.....	.....	—35,000	+29,000	+35,000	—29,000
(Daily Average)	+79	+65	.....	.....	.....	—389	+319	+380	—315
NEW SUPPLY									
Total New Supply	**2,757,973**	**2,864,188**	**+ 3.9**	**2,920,000**	**+ 1.9**	**732,000**	**714,000**	**722,000**	**752,000**
(Daily Average)	7,556	7,825	+ 3.6	**8,000**	+ 2.2	8,133	7,846	7,848	8,174
Domestic Production, Total	**2,450,252**	**2,515,262**	**+ 2.7**	**2,541,000**	**+ 1.0**	**634,000**	**622,000**	**634,000**	**651,000**
(Daily Average)	6,713	6,872	+ 2.4	**6,962**	+ 1.3	7,044	6,835	6,891	7,076
Crude Oil	2,244,529	2,294,016	+ 2.2	**2,310,000**	+ 0.7	576,000	566,000	577,000	591,000
(Daily Average)	6,149	6,268	+ 1.9	**6,329**	+ 1.0	6,400	6,220	6,272	6,424
Other Oils	205,723	221,246	+ 7.5	**231,000**	+ 4.4	58,000	56,000	57,000	60,000
(Daily Average)	564	604	+ 7.1	**633**	+ 4.8	644	615	619	652
Imports, Total	**307,721**	**348,926**	**+ 13.4**	**379,000**	**+ 8.6**	**98,000**	**92,000**	**88,000**	**101,000**
(Daily Average)	843	953	+ 13.0	**1,038**	+ 8.9	1,089	1,011	956	1,098
Crude Oil	179,073	209,228	+ 16.8	**234,000**	+ 11.8	57,000	58,000	59,000	60,000
(Daily Average)	491	571	+ 16.3	**641**	+ 12.3	633	637	641	652
Refined Products	128,648	139,698	+ 8.6	**145,000**	+ 3.8	41,000	34,000	29,000	41,000
(Daily Average)	352	382	+ 8.5	**397**	+ 3.9	456	374	315	446
Crude Oil Runs to Stills, Total	**2,370,404**	**2,440,003**	**+ 2.9**	**2,505,000**	**+ 2.7**	**622,800**	**614,300**	**626,500**	**641,400**
(Daily Average)	6,494	6,666	+ 2.6	**6,863**	+ 3.0	6,920	6,750	6,810	6,972
Demand for Domestic Crude, Total	**2,234,123**	**2,284,084**	**+ 2.2**	**2,310,000**	**+ 1.1**	**576,000**	**566,000**	**577,000**	**591,000**
(Daily Average)	6,121	6,241	+ 2.0	**6,329**	+ 1.4	6,400	6,220	6,272	6,424

* Includes crude oil used as fuel and lost in handling, liquefied gases, petroleum coke, asphalt, road oil, etc., and refinery losses.

Demand for and Supply of All Oils, Crude Oils, Motor Fuel, Kerosine, Fuel Oils and Lubricants

Sources: U. S. Bureau of Mines except November and December, 1952, estimated with aid of A.P.I. reports.

(THOUSANDS OF BARRELS)

ITEM	Year 1951	Year 1952	% Diff. '51-'52
ALL OILS			
Domestic Production, Total	2,450,252	2,515,262	+ 2.7
(Daily Average)	6,713	6,872	+ 2.4
Crude Petroleum	2,244,529	2,294,016	+ 2.2
(Daily Average)	6,149	6,268	+ 1.9
Natural Gasoline	205,512	220,855	+ 7.5
(Daily Average)	563	603	+ 7.1
Benzol	211	391	+ 85.3
(Daily Average)	1	1	.....
Imports, Total	307,721	348,926	+ 13.4
(Daily Average)	843	953	+ 13.0
Crude Petroleum	179,073	209,228	+ 16.8
(Daily Average)	491	571	+ 16.3
Refined Products	128,648	139,698	+ 8.6
(Daily Average)	352	382	+ 8.5
Changes in Stocks, All Oils	+36,991	+36,547	.....
(Daily Average)	+101	+100	.....
Stocks, Beginning of Period	597,118	634,109	+ 6.2
Crude Oil	248,463	255,783	+ 2.8
Refined Products	341,300	370,140	+ 8.5
Natural Gasoline	7,355	8,186	+ 11.3
Stocks, End of Period	634,109	670,656	+ 5.8
(Days' Supply)	85	87	+ 2.4
Crude Oil	255,783	268,465	+ 5.0
Refined Products	370,140	393,856	+ 6.4
Natural Gasoline	8,186	8,335	+ 1.8
Demand, Total	2,720,983	2,827,641	+ 3.9
(Daily Average)	7,455	7,726	+ 3.6
Exports, Total	154,428	153,970	— 0.3
(Daily Average)	423	421	— 0.5
Crude Petroleum, Total	26,604	25,506	— 10.8
(Daily Average)	78	70	— 10.3
Refined Products, Total	125,824	128,464	+ 2.1
(Daily Average)	345	351	+ 1.7
Domestic Demand, Total	2,566,555	2,673,671	+ 4.2
(Daily Average)	7,032	7,305	+ 3.9
CRUDE PETROLEUM			
Supply:			
Domestic Production, Total	2,244,529	2,294,016	+ 2.2
(Daily Average)	6,149	6,268	+ 1.9
Imports, Total	179,073	209,228	+ 16.8
(Daily Average)	491	572	+ 16.3
Change in Stocks	+7,320	+12,682	.....
(Daily Average)	+20	+35	.....
Stocks, Beginning of Period	248,463	255,783	+ 2.9
Stocks, End of Period	255,783	268,465	+ 5.0
(Days' Supply)	39	39	.....
Supply, Total	2,416,282	2,490,562	+ 3.1
(Daily Average)	6,620	6,805	+ 2.8
Demand:			
Runs to Stills, Total	2,370,404	2,440,003	+ 2.9
(Daily Average)	6,494	6,666	+ 2.6
Domestic Crude	2,188,677	2,233,834	+ 2.1
(Daily Average)	5,996	6,103	+ 1.8
Foreign Crude	181,727	206,169	+ 13.4
(Daily Average)	498	563	+ 13.1
Exports, Total	28,604	25,506	— 10.8
(Daily Average)	78	70	— 10.3
Transfers to Fuel Oil Stocks	8,869	9,064	+ 2.2
(Daily Average)	24	25	+ 4.2
Distillate Fuel Oil	2,863	2,736	— 4.4
Residual Fuel Oil	6,006	6,328	+ 5.4
Used as Fuel, and Losses	8,405	15,989	+ 90.2
(Daily Average)	23	44	+ 91.3
Demand, Total	2,416,282	2,490,562	+ 3.1
(Daily Average)	6,620	6,805	+ 2.8
KEROSINE			
Production, Total	135,742	132,331	— 2.5
(Daily Average)	372	362	— 2.7
Percent Yield from Crude	5.7	5.4	.....
Change in Stocks	+7,658	+402	.....
(Daily Average)	+21	+1	.....
Stocks, Beginning of Period	21,430	27,088	+ 26.4
Stocks, End of Period	27,088	27,490	+ 1.5
(Days' Supply)	77	76	— 1.3
Demand, Total	128,084	131,929	+ 3.0
(Daily Average)	351	360	+ 2.6
Exports, Total	6,818	8,047	+ 18.0
(Daily Average)	19	22	+ 15.8
Domestic Demand	121,266	123,882	+ 2.2
(Daily Average)	332	338	+ 1.8

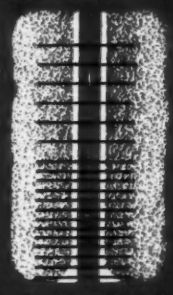
ITEM	Year 1951	Year 1952	% Diff. '51-'52
MOTOR FUEL			
Production, Total	1,139,511	1,190,046	+ 4.4
(Daily Average)	3,121	3,252	+ 4.2
Refinery Gasoline, Total	1,009,630	1,051,871	+ 4.2
(Daily Average)	2,763	2,874	+ 4.0
(Yield from Crude)	42.4	42.9	.....
Natural Gasoline, etc.	205,512	220,855	+ 7.5
(Daily Average)	563	603	+ 7.1
Less sales of L.P.G.	72,431	79,033	+ 9.1
Less transfers cycle prods.	3,411	4,038	+ 18.3
Benzol	211	391	+ 85.3
Imports, Total	418	1,603	+283.5
(Daily Average)	1	4	+300.0
Change in Stocks	+11,604	+1,389	.....
(Daily Average)	+32	+4	.....
Stocks, Beginning of Period	123,702	135,306	+ 9.4
Finished Gasoline	116,347	127,120	+ 9.3
Natural Gasoline	7,355	8,186	+ 11.3
Stocks, End of Period	135,306	136,695	+ 1.0
(Days' Supply)	44	42	— 4.6
Finished Gasoline	127,120	128,360	+ 1.0
Natural Gasoline	8,186	8,335	+ 1.8
Demand, Total	1,128,325	1,190,260	+ 5.4
(Daily Average)	3,091	3,252	+ 5.2
Exports, Total	40,356	32,983	— 18.3
(Daily Average)	110	90	— 18.2
Domestic Demand	1,087,969	1,157,277	+ 6.4
(Daily Average)	2,981	3,162	+ 6.1
DISTILLATE FUEL OIL			
Production, Total	475,801	522,077	+ 9.7
(Daily Average)	1,304	1,427	+ 9.4
Percent Yield from Crude	20.0	21.3	.....
Transfers from Crude	2,863	2,736	— 4.4
(Daily Average)	8	7	— 12.5
Imports, Total	1,924	2,273	+ 18.1
(Daily Average)	5	6	+ 20.0
Change in Stocks	+10,598	+15,224	.....
(Daily Average)	+29	+42	.....
Stocks, Beginning of Period	76,021	86,619	+ 13.9
Stocks, End of Period	86,619	101,843	+ 17.6
(Days' Supply)	67	73	+ 9.0
Demand, Total	469,990	511,862	+ 8.9
(Daily Average)	1,288	1,398	+ 8.5
Exports, Total	22,674	31,970	+ 41.1
(Daily Average)	62	87	+ 40.3
Domestic Demand	447,316	479,872	+ 7.3
(Daily Average)	1,226	1,311	+ 6.9
RESIDUAL FUEL OIL			
Production, Total	469,377	452,615	— 3.6
(Daily Average)	1,286	1,237	— 3.8
Percent Yield from Crude	19.7	18.5	.....
Transfers from Crude	6,006	6,328	+ 5.4
(Daily Average)	16	17	+ 6.3
Imports, Total	118,675	127,530	+ 7.5
(Daily Average)	325	348	+ 7.1
Change in Stocks	+1,153	+6,246	.....
(Daily Average)	+3	+17	.....
Stocks, Beginning of Period	41,700	42,853	+ 2.8
Stocks, End of Period	42,853	49,117	+ 14.6
(Days' Supply)	26	31	+ 19.2
Demand, Total	592,905	580,227	— 2.1
(Daily Average)	1,624	1,585	— 2.4
Exports, Total	29,058	29,046	— 0.1
(Daily Average)	79	79	.....
Domestic Demand	563,847	551,181	— 2.3
(Daily Average)	1,545	1,506	— 2.5
LUBRICANTS			
Production, Total	61,489	56,212	— 8.6
(Daily Average)	169	154	— 8.3
Percent Yield from Crude	2.6	2.3	.....
Change in Stocks	+1,768	+883	.....
(Daily Average)	+5	+2	.....
Stocks, Beginning of Period	7,849	9,617	+ 22.5
Stocks, End of Period	9,617	10,500	+ 9.2
(Days' Supply)	59	69	+ 16.9
Demand, Total	59,721	55,329	— 7.4
(Daily Average)	164	151	— 7.9
Exports, Total	17,417	16,300	— 6.4
(Daily Average)	48	44	— 8.3
Domestic Demand	42,304	39,029	— 7.8
(Daily Average)	116	107	— 7.8

"This field hands us some problems, Joe... Gas Control, for one thing.

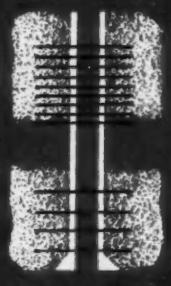
"I know it, Bob... that's why so many of the boys are using Lane-Wells selective perforating."

"Here's what it means...

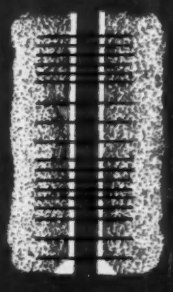
Lane-Wells *selective* perforating gives you complete flexibility, tailors the perforating to your conditions. You're not limited to a particular pattern or shot spacing.



Gas control, you mentioned. Selective perforating lets you perforate something like this, maybe, to bring in just enough gas to lift your oil, without wasting gas.



Or say you're producing from two zones, one of 'em much tighter than the other. Selective perforating gives you greater shot density in the tight zone, something like this.



We've even run into single zones that required different perforating densities in different parts of the same formation. With selective perforating, you can put just the number of shots you want in the place you want, while the gun is down hole.

In other words, Bob—Lane-Wells *selective* perforating lets *you* determine the perforating schedule your conditions call for. You call the tune; we'll play it!".

Tomorrow's Tools-Today!

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You get results with

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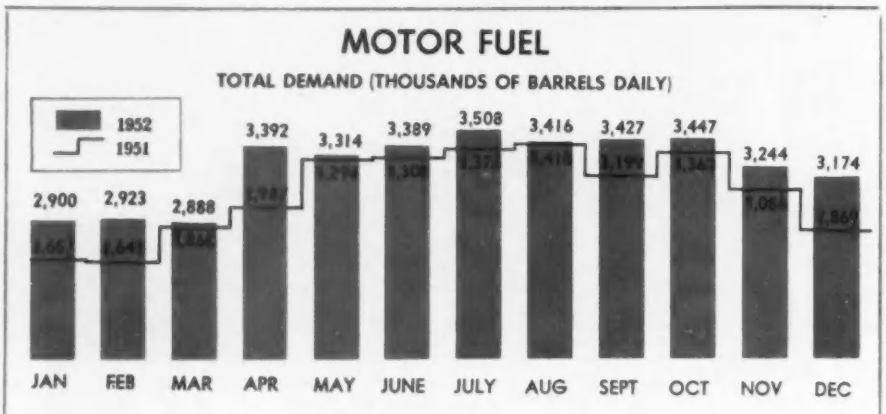
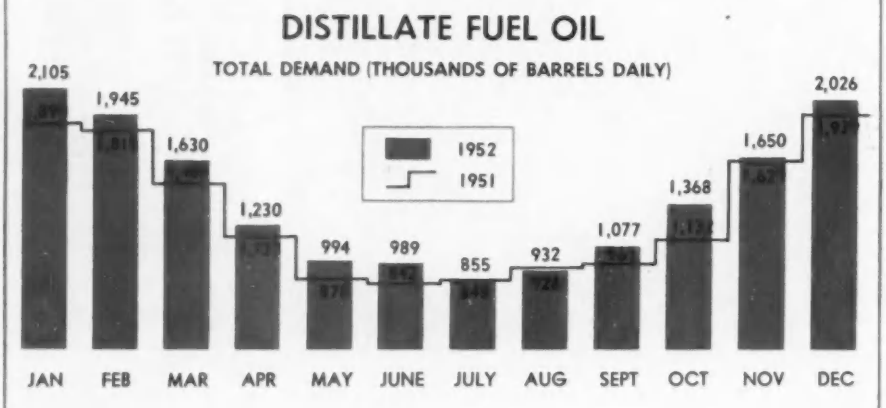
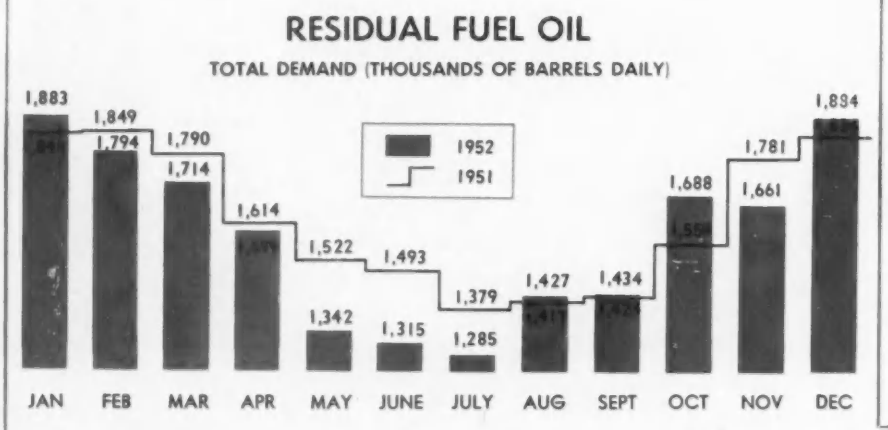
LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

1953







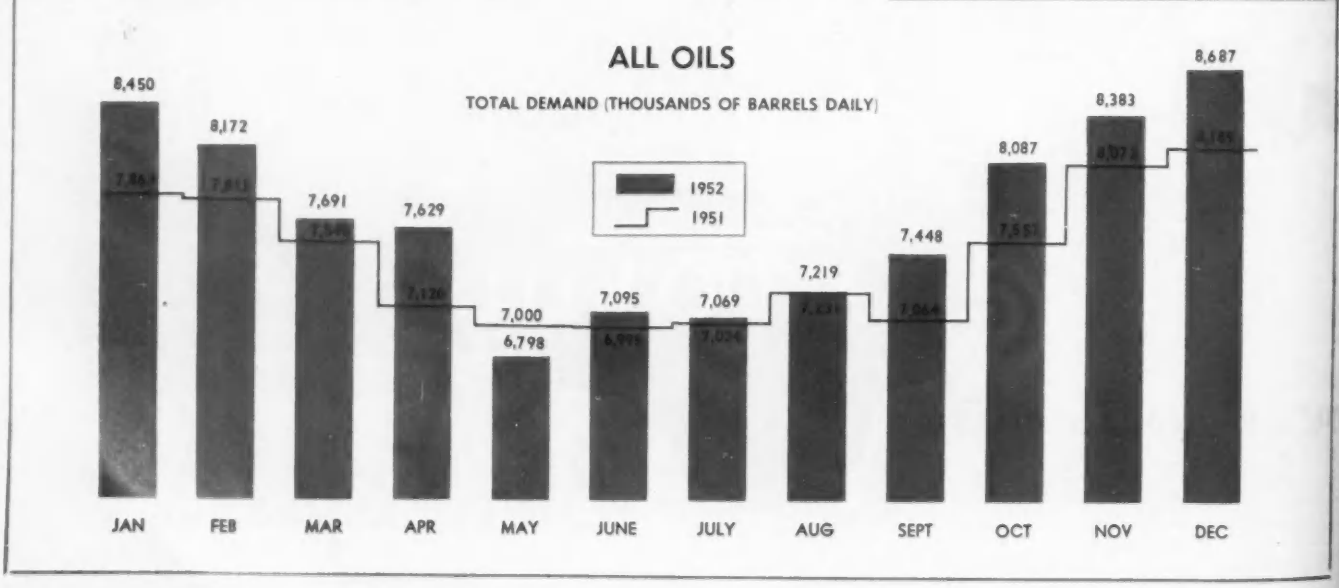
rising 6.1 percent in 1952. Partly offsetting the increase in domestic consumption will be a further drop of exports to 82,000 barrels daily from 90,000 in 1952 and 110,000 in 1951.

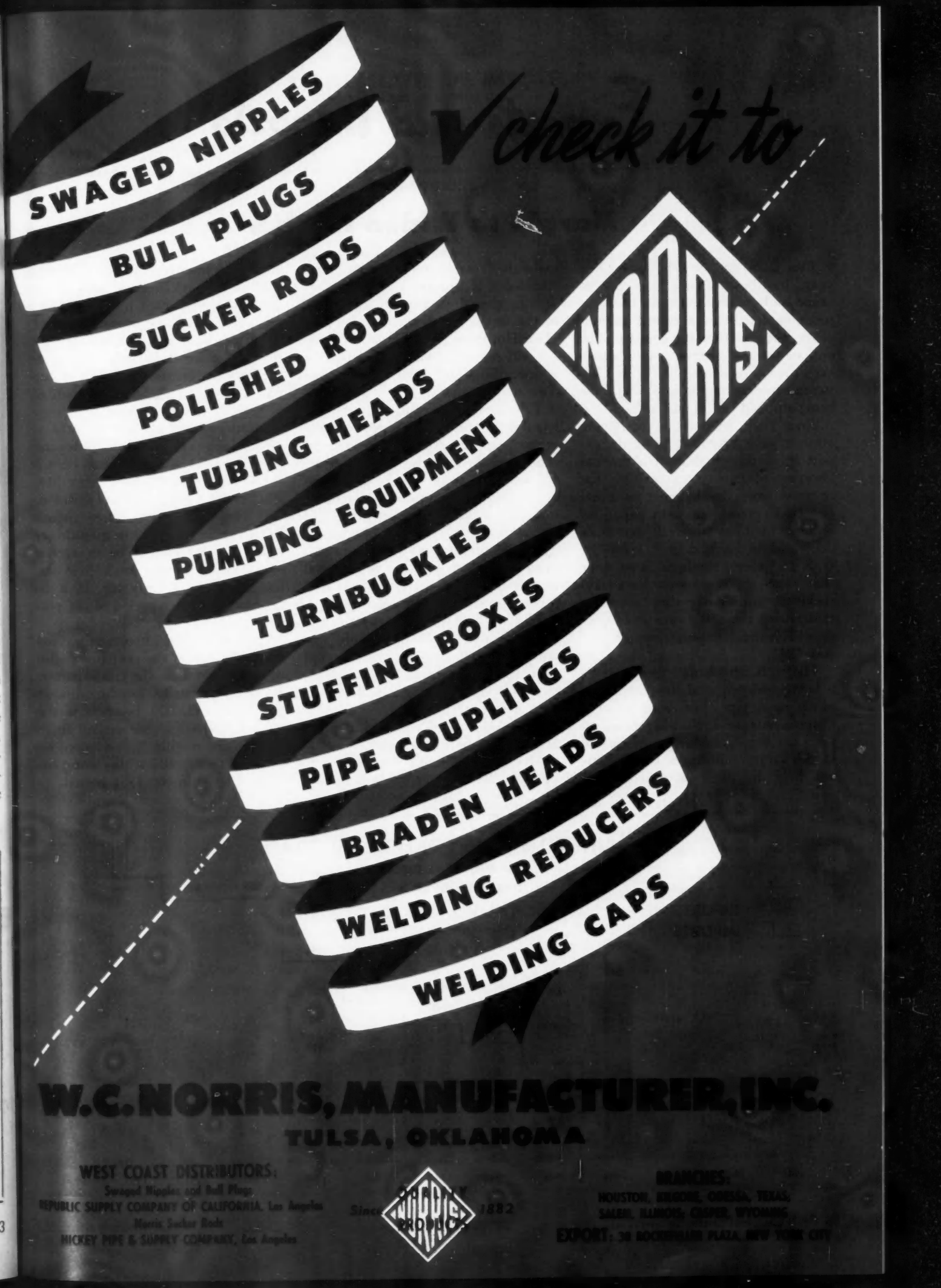
Daily average total demand for kerosine will increase 3.6 percent in 1953 after rising 2.6 percent in 1952. But domestic consumption will be up 5.3 percent, it is forecast, in comparison with an increase of 1.8 percent in 1952. Exports are forecast at 17,000 barrels daily, after rising to 22,000 daily in 1952 from 19,000 in 1951.

Distillate Demand

Average daily total demand for distillate fuel oil will increase only 6.2 percent in 1953 after rising 8.5 percent in 1952, with exports down to 66,000 barrels daily after shooting to 87,000 daily in 1952 from 62,000 in 1951, in temporarily supplying markets left short by the closing down of Iranian production. Domestic consumption of distillate will increase 8.2 percent in 1953 after climbing 6.9 percent in 1952, continuing healthy growth, though at less than the abnormal high rates of some recent years.

The daily average total demand for residual fuel oil will rise 1.1 percent in 1953 after dropping 2.4 percent in 1952. But domestic consumption will show an increase of 2.6 percent, in contrast with a decrease of 2.5 percent in 1952, thereby recovering to the 1951 level of 1,545,000 barrels daily. Residual exports are forecast at 58,000 barrels daily in 1953, after holding at 79,000 daily in 1952, the same as in 1951.




SWAGED NIPPLES
BULL PLUGS
SUCKER RODS
POLISHED RODS
TUBING HEADS
PUMPING EQUIPMENT
TURNBUCKLES
STUFFING BOXES
PIPE COUPLINGS
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Exports and Imports

Margin to Widen Further

THE U. S., for the fifth consecutive year, has been a net importer of crude and refined oils, and the year just completed saw a record amount of foreign oils enter the country. The outlook for the current year is for an even greater widening of the gap between supplies coming into, and those being shipped out of, the nation.

Since 1947, when U. S. petroleum imports were almost equaling the export level, there has been a gradual lowering of exports rates. This has resulted from development of other countries' production and expanded refining facilities in areas that once depended in some degree upon the U. S. for refined products. Also, since that time U. S. imports have skyrocketed, until today they are more than twice the 1947 rate and more than 3½ times importations of prewar 1941.

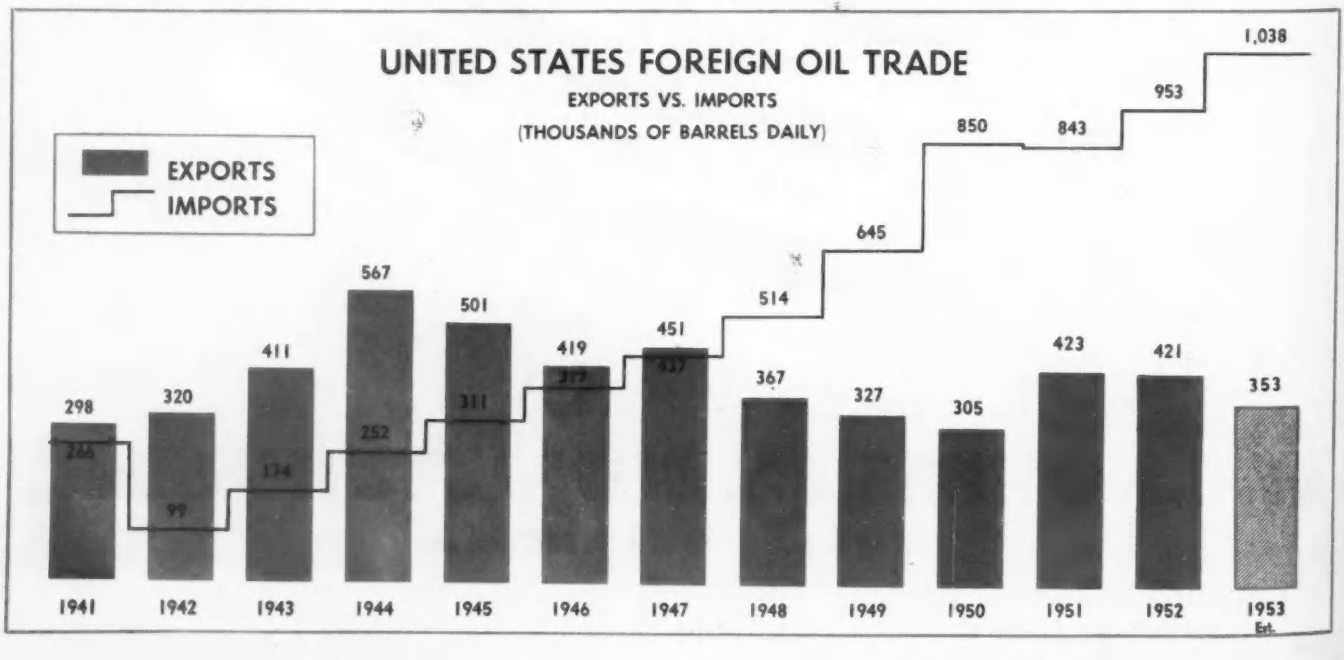
The U. S. petroleum export market is being whittled, and the completion of a new pipe line into Eastern Canada late in 1953 will reduce it even further. Canada is now one of U. S.'s largest customers, but the line will help distribute its own oil and make that country more independent. Expansion of European and Asian refineries has already made that part of the world less dependent for supplies. However, the lube export market will remain strong, and exporting of specialities and some aviation gasoline will continue.

The controversial question of whether imports were supplementing or supplanting domestic production continued through the year as it will for years to come. There seems no satisfactory or mutually acceptable solution to the import problem, and as the industry continued divided on this point, imports rose to a new all-time peak. An average of 953,400 barrels a day of foreign crude and products were brought into the U. S. during 1952, to substantially top the previous high of 850,000 daily imported in 1950. Imports are expected to reach an average of 1,038,400 barrels daily during 1953, which would be a new peak and the first time in history that imports averaged as much as 1 million barrels a day.

Movement of crude into the U. S. averaged 571,700 barrels daily during 1952 and that amounted to 60 percent of total oil imports. A year earlier, crude amounted to 490,600 barrels a day and 58 percent of the total. A further increase in crude imports is forecast for 1953, when they are expected to amount to 641,100 barrels a day and slightly less than 62 percent of the over-all.

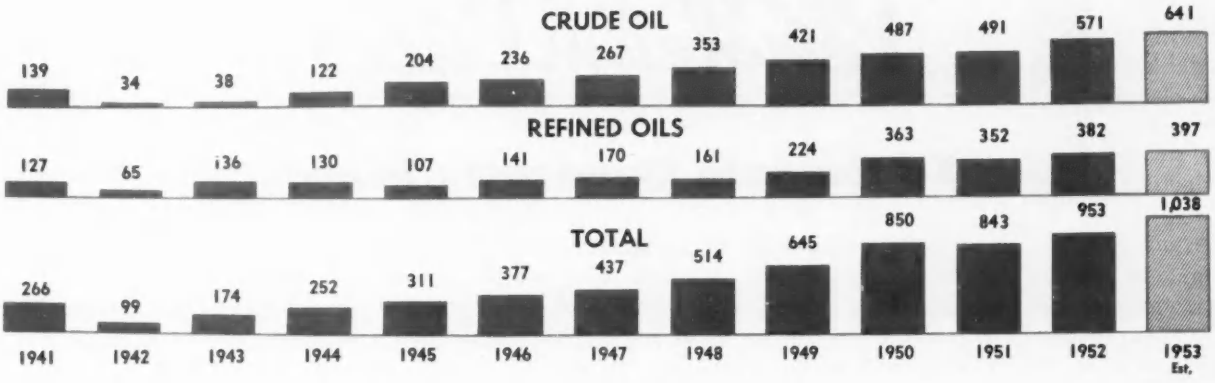
During the first five months of 1952, imports of crude were only slightly higher than they had been in the same period of 1951, being 514,700 barrels a day compared with 496,100. However, in the seven months following the strike in the oil industry, crude imports jumped to an average of 612,400 barrels a day, while they had amounted to only 486,700 a day in the comparable period of the prior year.

Refined product imports gained considerably during the year just passed, but did not follow the crude pattern. Prior to the strike, product imports averaged 427,600 barrels a day against 409,700 a year earlier. In the latter seven months, this average was lowered to 349,100 a day compared with 312,100 in the 1951 period.



UNITED STATES OIL IMPORTS

(THOUSANDS OF BARRELS DAILY)



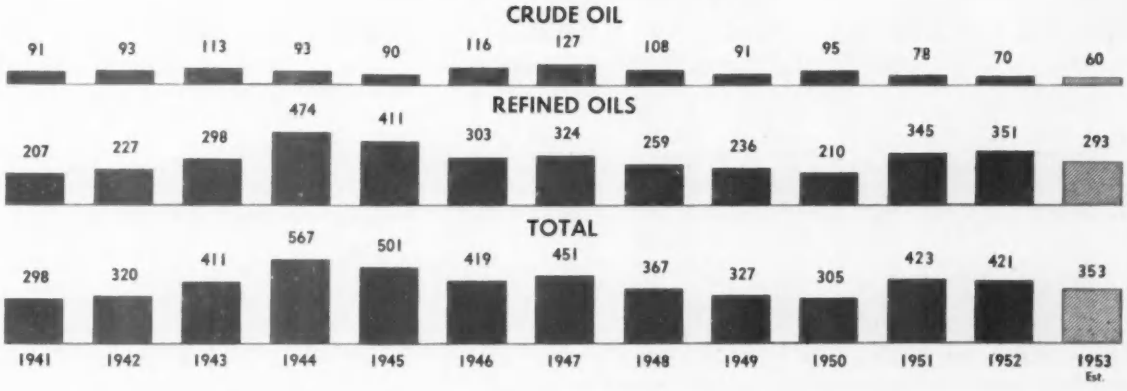
(All Figures in Barrels)

	IMPORTS						EXPORTS					
	CRUDE OIL		REFINED PRODUCTS		TOTAL IMPORTS		CRUDE OIL		REFINED PRODUCTS		TOTAL EXPORTS	
YEAR	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	37,736,000	103,400	1,227,000	3,400	38,963,000	106,800	5,884,000	16,100	62,234,000	170,500	68,118,000	186,600
1919	52,822,000	144,700	1,376,000	3,800	54,198,000	148,500	6,348,000	17,400	57,545,000	157,600	63,893,000	175,100
1920	106,175,000	290,100	2,647,000	7,200	108,822,000	297,300	9,295,000	25,400	70,323,000	192,100	79,618,000	217,500
1921	125,364,000	343,500	3,428,000	9,400	128,792,000	352,900	9,527,000	26,400	62,254,000	170,500	71,881,000	196,900
1922	130,255,000	356,800	5,719,000	15,700	135,974,000	372,500	10,805,000	29,600	63,745,000	174,600	74,550,000	204,200
1923	82,015,000	224,700	17,638,000	48,300	99,653,000	273,000	17,534,000	48,000	84,800,000	232,300	102,334,000	280,300
1924	77,775,000	212,500	16,806,000	45,900	94,581,000	258,400	18,239,000	49,800	99,089,000	270,700	117,328,000	320,500
1925	61,824,000	169,400	16,376,000	44,900	78,200,000	214,300	13,337,000	36,500	100,684,000	275,900	114,021,000	312,400
1926	60,382,000	165,400	20,938,000	57,400	81,320,000	222,800	15,407,000	42,200	116,999,000	320,600	132,406,000	362,800
1927	58,383,000	159,900	13,353,000	36,600	71,736,000	196,500	15,844,000	43,400	126,419,000	346,400	142,263,000	389,800
1928	79,767,000	218,000	11,790,000	32,200	91,557,000	250,200	18,966,000	51,800	135,991,000	371,600	154,957,000	423,400
1929	78,933,000	216,200	29,777,000	81,600	108,710,000	297,800	26,401,000	72,300	136,719,000	374,600	163,120,000	446,900
1930	62,129,000	170,200	43,489,000	119,200	105,618,000	289,400	23,705,000	64,900	132,790,000	363,800	156,495,000	428,700
1931	47,250,000	129,500	38,837,000	106,400	86,087,000	235,900	25,535,000	70,000	98,819,000	270,700	124,354,000	340,700
1932	44,682,000	122,100	29,812,000	81,400	74,494,000	203,500	27,393,000	74,900	75,882,000	207,300	103,275,000	282,200
1933	31,893,000	87,400	13,501,000	37,000	45,394,000	124,400	36,584,000	100,200	70,143,000	192,200	106,727,000	292,400
1934	35,558,000	97,400	14,936,000	40,900	50,494,000	138,300	41,127,000	112,700	73,380,000	201,000	114,507,000	313,700
1935	32,239,000	88,300	20,396,000	55,900	52,635,000	144,200	51,430,000	140,900	77,557,000	212,500	128,987,000	353,400
1936	32,327,000	88,300	24,777,000	67,700	57,104,000	156,000	50,313,000	137,400	81,681,000	223,300	131,994,000	360,600
1937	27,484,000	75,300	29,673,000	81,300	57,157,000	156,600	67,234,000	184,200	105,600,000	289,300	172,834,000	473,500
1938	26,412,000	72,400	27,896,000	76,400	54,308,000	148,800	77,254,000	211,700	116,474,000	319,100	193,728,000	530,800
1939	33,095,000	90,700	25,965,000	71,100	59,060,000	161,800	72,076,000	197,500	116,883,000	320,200	188,959,000	517,700
1940	42,662,000	116,600	41,089,000	112,200	83,751,000	228,800	51,496,000	140,700	78,970,000	215,800	130,466,000	356,600
1941	50,606,000	138,700	46,536,000	127,500	97,142,000	266,200	33,238,000	91,100	75,592,000	207,100	108,830,000	298,200
1942	12,297,000	33,700	23,669,000	64,800	35,966,000	98,500	33,834,000	92,700	83,073,000	227,600	116,907,000	320,300
1943	13,833,000	37,900	49,579,000	135,800	63,412,000	173,700	41,342,000	113,200	108,615,000	297,600	149,957,000	410,800
1944	44,805,000	122,400	47,506,000	129,800	92,311,000	252,200	34,238,000	93,500	173,378,000	473,700	207,616,000	567,200
1945	74,337,000	203,600	39,282,000	107,600	113,619,000	311,200	32,998,000	90,400	149,985,000	410,900	182,983,000	501,300
1946	86,066,000	235,800	51,610,000	141,400	137,676,000	377,200	42,436,000	116,300	110,687,000	303,200	153,123,000	419,500
1947	97,532,000	267,200	61,857,000	169,500	159,389,000	436,700	46,355,000	127,000	118,122,000	323,600	164,477,000	450,600
1948	129,093,000	352,700	59,051,000	161,300	188,144,000	514,000	39,736,000	108,200	94,938,000	259,100	134,674,000	367,400
1949	153,686,000	421,100	81,873,000	224,300	235,559,000	645,400	33,069,000	90,600	86,307,000	236,500	119,376,000	327,100
1950	177,714,000	486,900	132,547,000	363,100	310,261,000	850,000	34,823,000	95,400	76,483,000	209,500	111,306,000	304,900
1951	179,073,000	490,600	128,648,000	352,500	307,721,000	843,100	28,604,000	78,400	125,824,000	344,700	154,428,000	423,100
1952	209,228,000	571,700	139,698,000	381,700	348,926,000	953,400	25,506,000	69,700	128,464,000	351,000	153,970,000	420,700
1953 Est.	234,000,000	641,100	145,000,000	397,300	379,000,000	1,038,400	22,000,000	60,300	107,000,000	293,100	129,000,000	353,400

Source: U. S. Bureau of Mines, except 1952 includes estimates for November and December.

UNITED STATES OIL EXPORTS

(THOUSANDS OF BARRELS DAILY)



Petroleum Prices

To Remain Generally Stable

By **DON KLIEWER,** WORLD OIL Staff

ALTHOUGH PRICES of crude and refined products have continued unchanged at levels where they were frozen by government price restrictions in late January, 1951, a measure of relief for the industry is now in sight. Petroleum price controls are to be removed April 30, with fractional increases expected to follow.

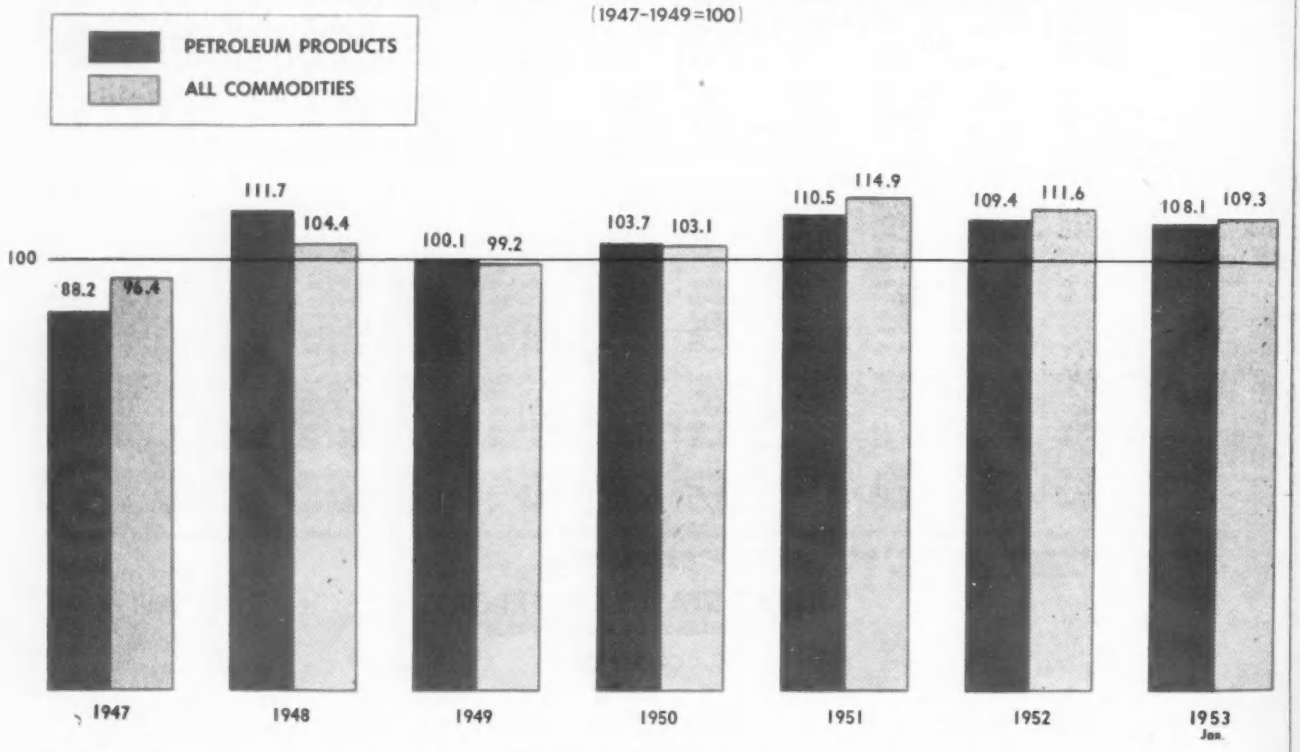
Elated over prospects that the industry will be allowed to return to the status of unfettered, competitive enterprise in a free market, industry leaders feel that price decontrol will have no generally inflationary effect on the nation's economy, and government officials agree.

It is conceded that, particularly in the oil-short areas of the West Coast, some fractional increases will result from decontrol but that prices for the remainder of the nation probably will stabilize around current price levels. The former administration had predicted that removal of ceilings on crude and products would cost the U. S. $1 billion a year.

The highly-competitive oil industry will go into decontrol with ample stocks of crude and most refined prod-

WHOLESALE PRICE INDICES
ALL COMMODITIES VS. PETROLEUM PRODUCTS

(1947-1949=100)



YEAR	All Commodities	* Petroleum	YEAR	All Commodities	* Petroleum	YEAR	All Commodities	* Petroleum	YEAR	All Commodities	* Petroleum	YEAR	All Commodities	* Petroleum
Old Basis (1926=100)			1925	103.5	95.0	1934	74.9	50.5	1943	103.1	62.5	New Basis (1947-1948=100)		
1918	131.3	135.3	1926	100.0	100.0	1935	80.0	51.3	1944	104.0	63.9			
			1927	95.4	72.7	1936	80.8	57.3	1945	105.8	63.5	1947	96.4	88.2
1919	138.6	128.0	1928	96.7	72.0	1937	86.3	60.5	1946	121.1	67.5	1948	104.4	111.7
1920	154.4	183.5	1929	95.3	71.3	1938	78.6	55.9	1947	151.8	90.0	1949	99.2	100.1
1921	97.6	102.9	1930	86.4	61.5	1939	77.1	52.2	1948	165.1	122.1	1950	103.1	103.7
1922	96.7	102.9	1931	73.0	39.5	1940	78.6	50.0	1949	155.0	112.2	1951	114.9	110.5
1923	100.6	82.6	1932	64.8	45.4	1941	87.3	57.0	1950	161.5	113.9	1952	111.6	109.4
1924	98.1	83.5	1933	65.9	41.0	1942	98.8	59.8	1951	180.2	120.1	1953 (Jan.)	109.3	108.1

* Crude petroleum and petroleum products. **Source:** Survey of Current Business.

ucts and a bearish market. These circumstances may serve to lead domestic producers, who have been caught between a five-year price control status and spiraling production costs, to tread softly with demands.

While openly awaiting a price increase, some major producers disclaim they will hold out for a 50-cent-a-barrel across-the-board increase which others hope will result.

"We couldn't hold such a sharp rise," one major producer readily admitted. "While it is necessary for the price to rise somewhat to allow an incentive for companies to drill and find new reserves, a 50-cent price hike would push the price of oil to $3.15 in the case of East Texas—entirely too high."

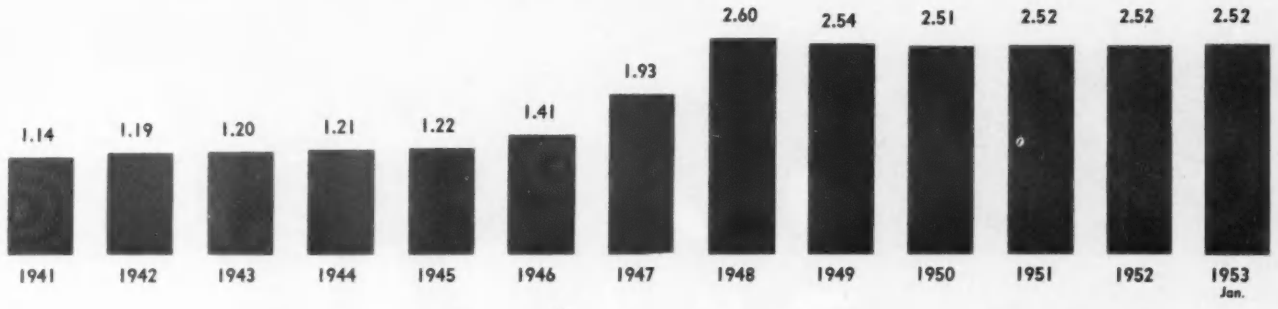
Producers agree that current drilling price schedules are insufficient especially for wildcat wells. And they are quick to point out that it is largely through such exploration that ever-needed reserves are discovered.

Motor fuel prices may stand some sort of an increase, but it is generally agreed that refiners simply could not make any money by refining $3.15 oil. The consuming public would not be able or would not want to pay much more for products.

The play of keen competition along the East Coast is an example. There, amply-stocked residual oil is selling below parity due to customers' whims and a luke-cold winter through February 15. The price is so low that coal interests are objecting strenuously. Some industrial plants are geared to use which ever is cheapest.

UNITED STATES CRUDE OIL PRICES

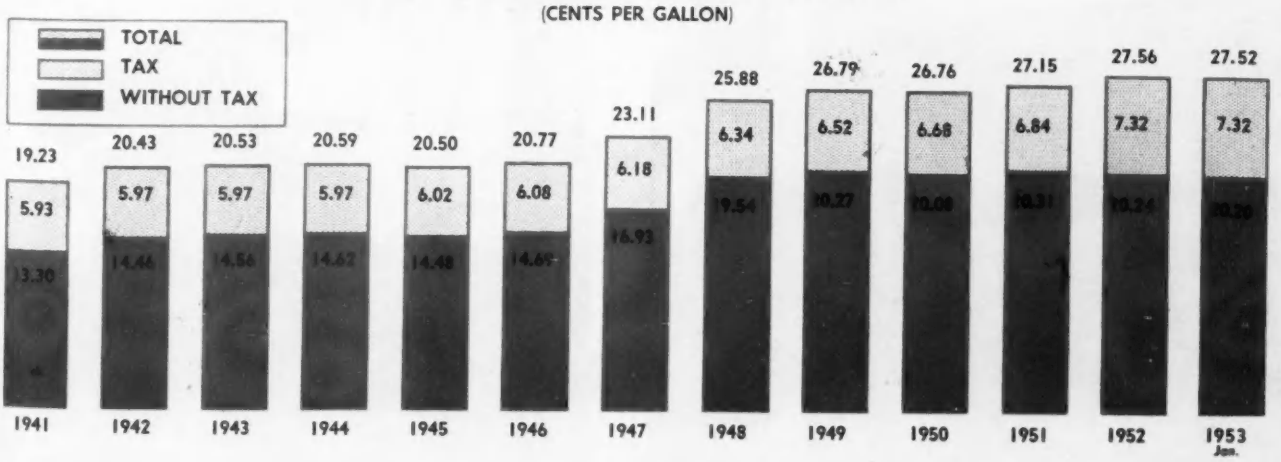
(DOLLARS PER BARREL)



YEAR	CRUDE OIL DOLLARS PER BARREL	GASOLINE CENTS PER GALLON 50 Cities Average			YEAR	CRUDE OIL DOLLARS PER BARREL	GASOLINE CENTS PER GALLON 50 Cities Average			YEAR	CRUDE OIL DOLLARS PER BARREL	GASOLINE CENTS PER GALLON 50 Cities Average		
	At Wells	Without Tax	Tax	With Tax		At Wells	Without Tax	Tax	With Tax		At Wells	Without Tax	Tax	With Tax
1918	1.98	25.12	0.00	25.12	1930	1.19	16.17	3.78	19.95	1942	1.19	14.46	5.97	20.43
1919	2.01	25.41	0.06	25.47	1931	.65	12.98	4.00	16.98	1943	1.20	14.56	5.97	20.53
1920	3.07	29.74	0.09	29.83	1932	.87	13.30	4.63	17.93	1944	1.21	14.62	5.97	20.59
1921	1.73	26.11	0.20	26.31	1933	.67	12.41	5.41	17.82	1945	1.22	14.48	6.02	20.50
1922	1.61	24.82	0.38	25.20	1934	1.00	13.64	5.21	18.85	1946	1.41	14.69	6.08	20.77
1923	1.34	21.06	0.91	21.97	1935	.97	13.55	5.29	18.84	1947	1.93	16.93	6.18	23.11
1924	1.43	19.46	1.48	20.94	1936	1.09	14.10	5.35	19.45	1948	2.60	19.54	6.34	25.88
1925	1.68	20.09	2.11	22.20	1937	1.18	14.59	5.40	19.99	1949	2.54	20.27	6.52	26.79
1926	1.88	20.97	2.41	23.38	1938	1.13	14.07	5.44	19.51	1950	2.51	20.08	6.68	26.76
1927	1.30	18.29	2.80	21.09	1939	1.02	13.31	5.44	18.75	1951	2.52	20.31	6.84	27.15
1928	1.17	17.90	3.04	20.94	1940	1.02	12.75	5.66	18.41	1952	2.52	20.24	7.32	27.56
1929	1.27	17.92	3.50	21.42	1941	1.14	13.30	5.93	19.23	1953 (Jan.)	2.52	20.20	7.32	27.52

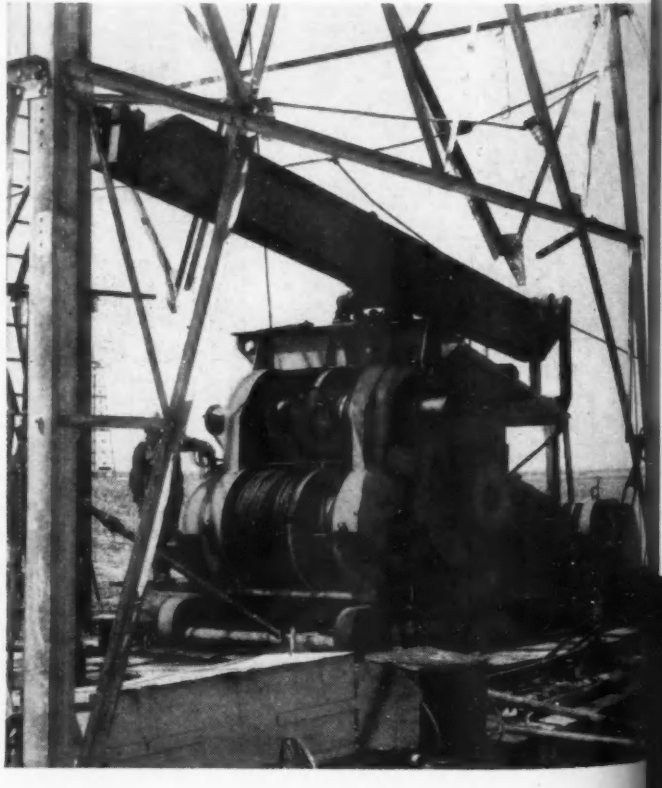
UNITED STATES GASOLINE PRICES

(CENTS PER GALLON)

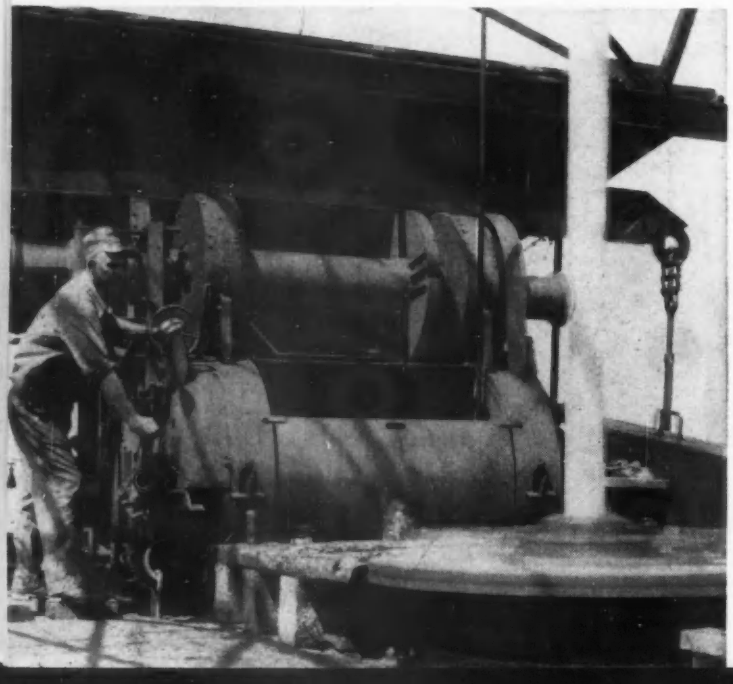


the

Model R with beam. Rotary assembly can be attached at same time.



Rotary drilling with 4½ inch drill pipe to 4,859 feet in Oklahoma.



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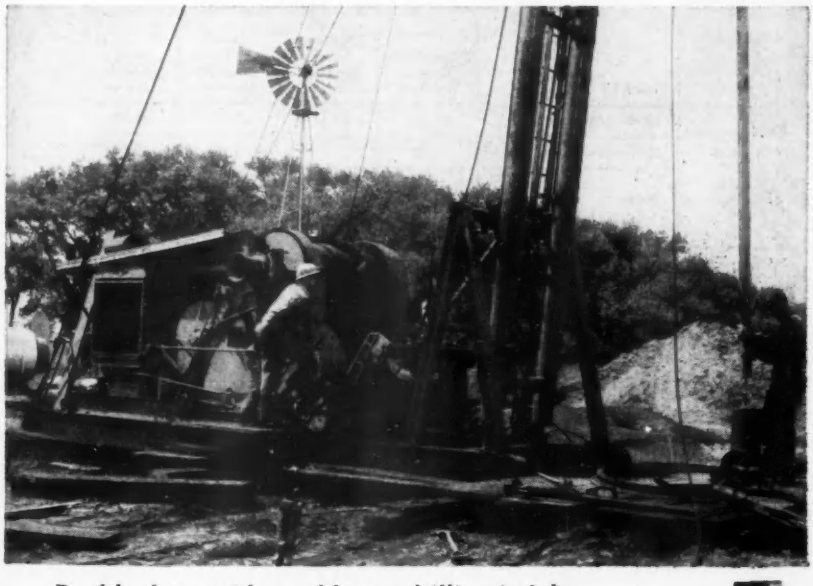
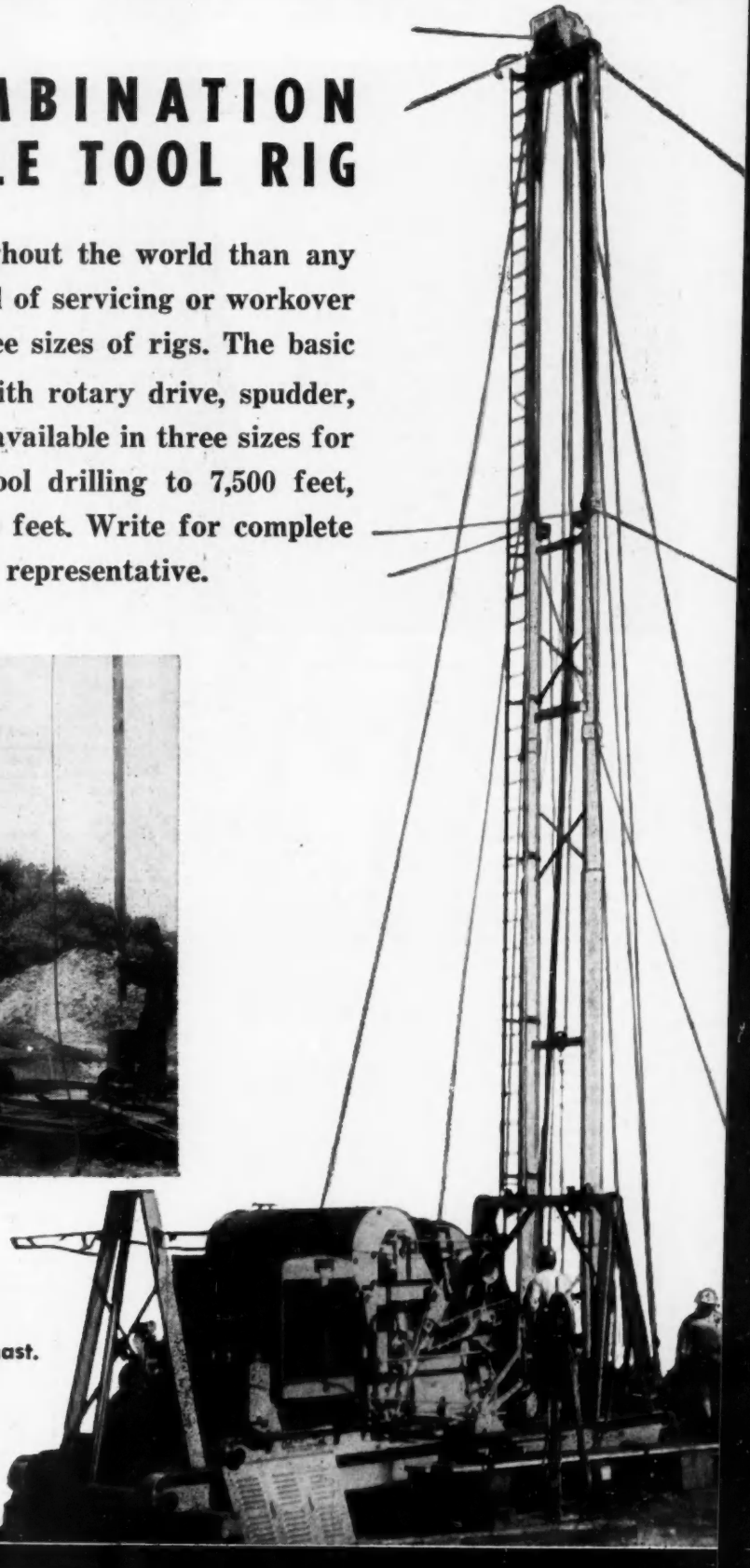
More of these rigs are in use throughout the world than any other model of drilling rig. Every kind of servicing or workover job is now being done with these three sizes of rigs. The basic double drum hoist can be equipped with rotary drive, spudder, third drum, or beam assembly, and is available in three sizes for rotary drilling to 5,000 feet, cable tool drilling to 7,500 feet, servicing and workover jobs to 10,000 feet. Write for complete catalog, or see your nearest Cardwell representative.



Double drum with spudder on drilling-in job.



Three-drum rig with spudder and 65-foot mast.

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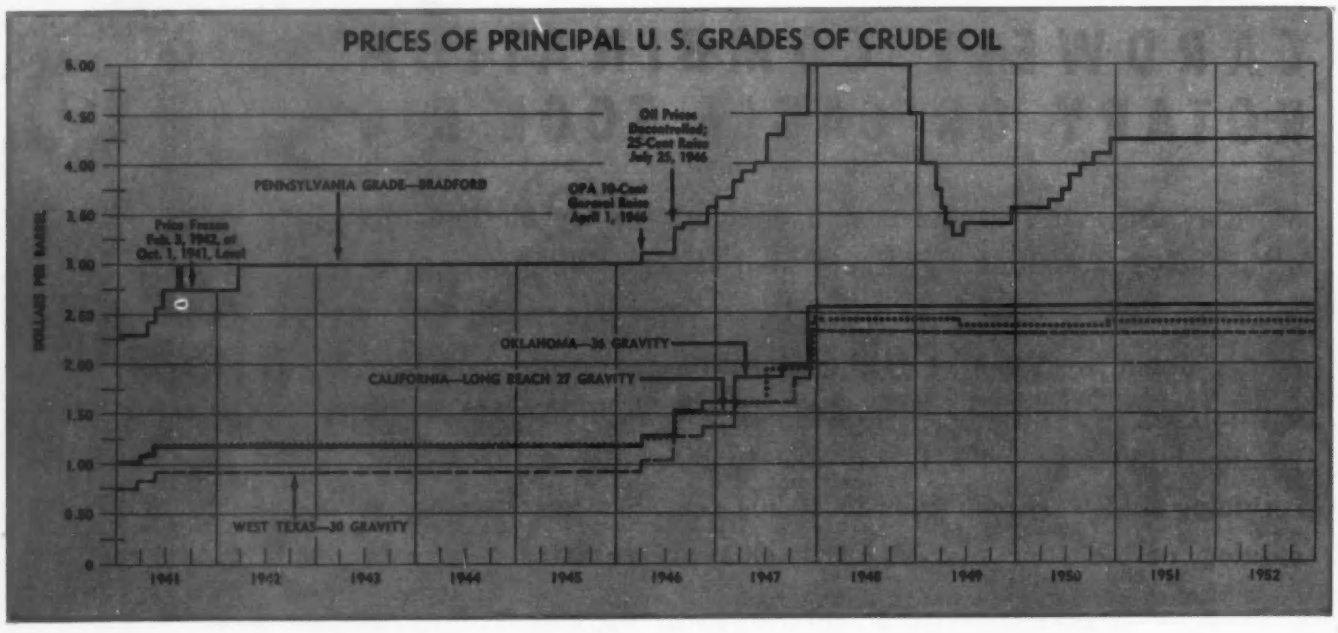
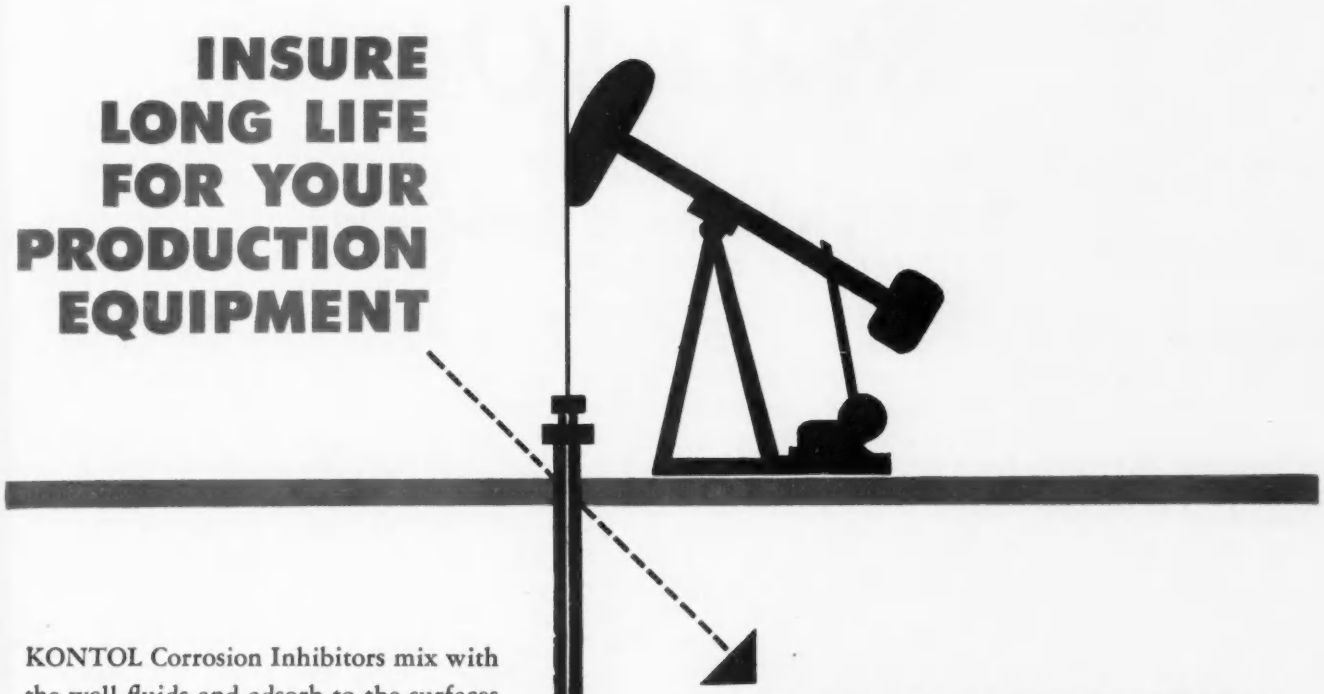
THERE IS A CARDWELL PARTS STOCK NEAR OR IN EVERY OIL FIELD OF THE WORLD.

With the petroleum industry as with all other industries operating in a laissez faire economy, price is the gauge by which it progresses. To keep prices within the range of consumer buying power and good-will, more and more reserves must be found. To find new reservoirs, wildcat wells must be drilled. For an adequate number of wildcats to be drilled, the price for oil must be adequate. Yet, wholesale price indices comparing all commodities with petroleum products show that the latter has trailed for the past three years.



DATE	Pennsylvania Grade, Bradford	Oklahoma-Kansas 36–36.9° Gravity	California, Long Beach 27–27.9° Gravity	W. Texas (Sour) 30–30.9° Gravity
1937—				
Prior to January 1	$2.15	$1.10	$1.10	$0.78
January 28	....	1.22	....	0.88
February 24	2.67	....	....	....
June 7	2.82	....	....	....
September 1	2.60	....	....	....
October 12	2.35	....	....	....
December 1	2.20	....	....	....
1938—				
March 7	2.05	....	....	....
June 13	1.80	....	....	....
September 1	1.68	....	....	....
October 12	....	1.02	....	0.75
1939—				
January 21	1.80	....	....	....
February 1	1.88	....	....	....
March 6	2.00	....	....	....
October 6	2.25	....	....	....
November 1	2.40	....	....	....
December 1	2.50	....	....	....
1940—				
January 1	2.75	....	....	....
February 1	....	....	1.03	....
May 22	2.50	....	....	....
June 18	2.25	....	....	....
July 12	2.00	....	....	....
August 18	1.85	....	....	....
November 12	2.00	....	....	....
December 17	2.15	....	....	....
1941—				
January 27	2.30	....	....	....
March 29	....	....	....	0.82
April 1	....	1.07	....	....
April 23	2.40	....	....	....
April 24	....	....	1.09	....
May 20	2.55	1.17	....	....
May 21	....	....	....	0.92
May 23	....	....	1.15	....
June 18	2.75	....	....	....
August 14	2.98	....	....	....
August 23	2.75	....	....	....
October 1 (Prices later frozen at levels of this date)	2.75	1.17	1.15	0.92
1942—				
February 3 (Prices frozen by O.P.A. at October 1, 1941 level)	2.75	1.17	1.15	0.92
March 26 (O. P. A. granted Penn. Grade raise)	3.00	....	....	..
1943—(Prices frozen)	3.00	1.17	1.15	0.92
1944—(Prices frozen)	$3.00	$1.17	$1.15	$0.92
1945—(Prices frozen)	3.00	1.17	1.15	0.92
1946—				
April 1 (O.P.A. 10c Raise)	3.10	1.27	1.25	1.02
July 25 (Oil Prices Decontrolled)	....	1.52	....	1.27
August 1	3.35	....	1.50	....
September 1	3.41	....	....	....
November 15	....	1.62	....	....
November 19	....	....	....	1.37
December 9	3.55	....	....	....
1947—				
January 1	3.65	....	....	....
March 1	3.81	....	....	....
March 10	....	1.87	....	1.62
March 19	....	....	1.75	....
April 1	3.91	....	....	....
May 16	4.05	....	....	....
July 1	4.30	....	1.95	....
September 1	4.50	....	....	....
October 15	....	2.07	....	....
October 16	....	....	....	1.82
December 1	5.00	....	....	....
December 6	....	2.57	....	2.32
December 27	....	....	2.45	....
1948—				
1948—December 11	4.50	....	....	....
1949—				
January 21	4.00	....	....	....
March 11	3.75	....	....	....
April 1	3.55	....	....	....
April 13	3.40	....	....	....
May 11	3.27	....	....	....
June 1	....	....	2.37	....
June 16	3.40	....	....	....
December 12	3.54	....	....	....
1950—				
May 1	3.65	....	....	....
June 21	3.75	....	....	....
July 19	3.89	....	....	....
August 25	4.00	....	....	....
October 9	4.10	....	....	....
December 9	4.25	....	....	....
December 12	....	....	2.41	....
1951—(Prices frozen at Jan. 25 level)	4.25	2.57	2.41	2.32
1952—(Prices frozen)	4.25	2.57	2.41	2.32

INSURE LONG LIFE FOR YOUR PRODUCTION EQUIPMENT



KONTOL Corrosion Inhibitors mix with the well fluids and adsorb to the surfaces of sucker-rods, casing, tubing, pumps, et cetera. This adsorbed Kontol film is impervious to the action of corrosive elements, greatly increasing the useful life of steel production equipment. Not only is hard-to-get steel conserved, but wells are produced more cheaply because of savings in down-time and costly pulling jobs. Kontol Corrosion Inhibitors are economical to buy, easy to use, safe to handle. If your wells are down frequently because of mechanical failures, corrosion may be the cause. For complete information on Kontol and the savings it will bring you, call your Tretolite Company service engineer.

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Stocks of Oils

Too High in Three Categories

HIGH TO AN UNHEALTHY degree, growing stocks of three categories of oils were at over-economic levels as the year began in 1953. While demand for these oils increased during 1952, the rise failed by substantial margins to keep pace with rising stock levels.

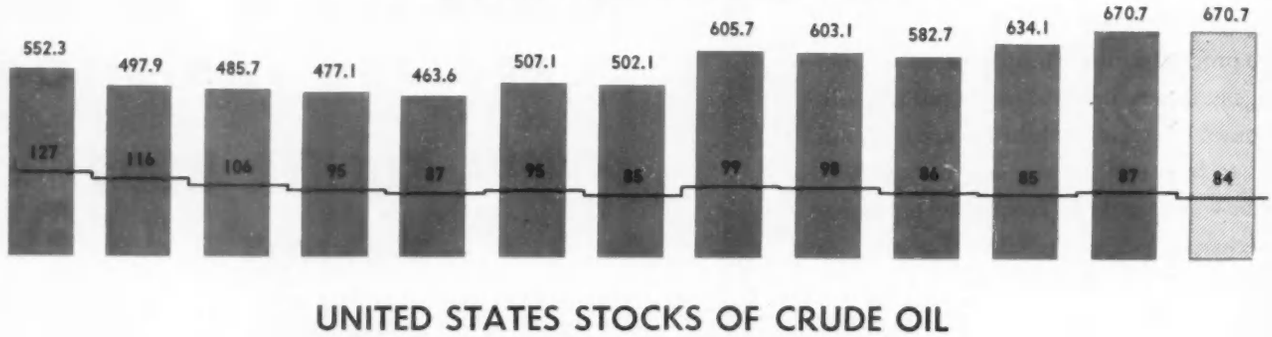
In terms of days' supply at the prevailing rate of demand, stocks of distillate fuel oil, residual fuel oil and lubricants were climbing excessively, leading to reports of sales below ceiling prices—a sure sign of a higher-than-needed inventory.

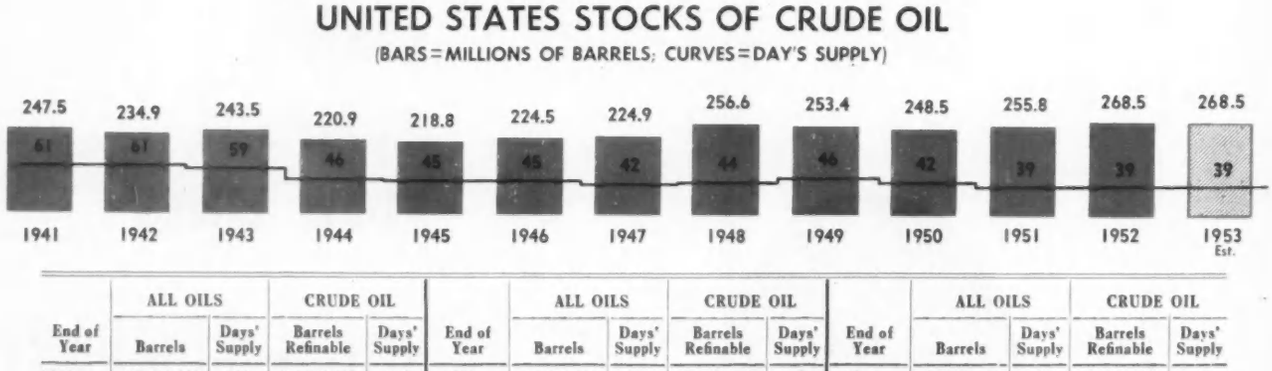
Distillate inventories at the end of 1952 amounted to a 73-day supply, 9 percent up from supplies at the same time the previous year when supply was good for 67 days. This supply is excessive, and a continuing warm winter could find stocks at winter's end at from 5 million to 7 million barrels higher than at the same time the previous year.

The increased days' supply stemmed from an imbalance in growth of stocks and demands. Stocks rose to 101,843,000 barrels at the close of 1952 from 86,619,000 barrels at 1951's end, a rise of 17.6 percent. Daily average demand rose only 8.5 percent—from 1,288,000 barrels the year before to 1,398,000 barrels at the close of last year.

The status of residual fuel oil is similar. Stocks of residual are high, resulting in sales below parity on the East Coast, and coal interests are voicing complaints. The situation may force reduced crude runs to stills.

At the close of 1952, residual fuel oil stocks of 49,117,000 barrels, up 14.6 percent from the figure at the same time the previous year, amounted to a 31-day supply. Total daily average demand, however, fell 2.4 percent to 1,585,000 barrels from 1,624,000 barrels in 1951.





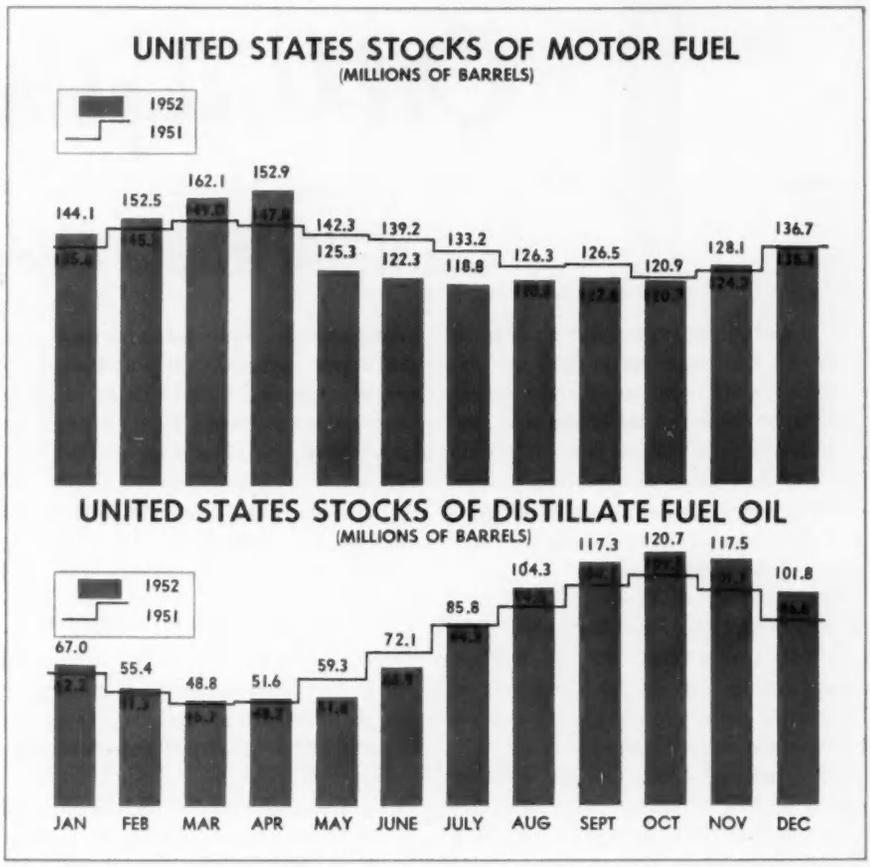
End of Year	ALL OILS Barrels	ALL OILS Days' Supply	CRUDE OIL Barrels Refinable	CRUDE OIL Days' Supply
1918	193,411,000	165	144,336,000	125
1919	200,383,000	164	149,356,000	127
1920	209,845,000	156	149,448,000	103
1921	294,428,000	203	217,324,000	150
1922	385,349,000	232	295,708,000	181
1923	492,088,000	235	340,637,000	169
1924	520,287,000	236	360,475,000	171
1925	552,464,000	239	345,863,000	150
1926	527,084,000	210	315,029,000	133
1927	597,176,000	231	379,660,000	155
1928	621,010,000	224	332,629,000	148
1929	689,166,000	228	428,445,000	149
1930	665,497,000	224	411,882,000	153
1931	621,673,000	221	370,194,000	144
1932	590,106,000	230	339,875,000	145
1933	602,198,000	226	354,223,000	140
1934	564,350,000	199	337,254,000	128
1935	541,700,000	178	314,855,000	109
1936	519,229,000	155	288,579,000	91
1937	564,728,000	154	305,833,000	87
1938	567,703,000	156	274,165,900	79
1939	525,838,000	135	238,910,000	66
1940	563,277,000	141	264,079,000*	70
1941	552,328,000	127	247,499,000	61
1942	497,940,000	116	234,889,000	61
1943	485,698,000	106	243,506,000	59
1944	477,089,000	95	220,862,000	46
1945	463,579,000	87	218,763,000	45
1946	507,094,000	95	224,473,000	45
1947	502,053,000	85	224,929,000	42
1948	607,856,000	99	246,572,000	43
*1948	605,743,000	99	All Crude 256,627,000	44
1949	603,119,000	98	253,356,000	46
1950	582,710,000	86	248,463,000	42
1951	634,109,000	85	255,783,000	39
1952	670,656,000	87	268,465,000	39
1953 Est.	670,656,000	84	268,456,000	39

* Revised; new basis.

Lubricants stocks also were so high that reports were common of sales at below-ceiling prices. As with residual fuel oil, the daily average demand was on a down-trend. It fell 7.9 percent from the previous year, to 151,000 barrels. To create the current imbalance of supply over demand, stocks at the end of the year had increased 9.2 percent from 1951, to 10,500,000 barrels. At the prevailing demand rate, the stocks were thus good for 69 days—16.9 percent more than the 59-day supply reported at the close of the previous year.

Little change is forecast in the demand for distillate fuel oil and residual fuel oil during 1953. Total demand for distillate is expected to rise only 5.9 percent above 1952 demand. And the 1952 increase from the previous year was 8.9 percent. The increase in 1953 residual fuel oil demand is forecast at .8 percent, as compared with 1952's decrease of 2.1 percent from 1951.

Crude, kerosine and motor fuel stocks are at satisfactory levels. Crude petroleum stocks at the end of the year were good for 39 days' supply, equal to the same period the previous year. This equilibruim was maintained on the basis of a 5 percent rise —to 268,465,000 barrels—over 1951 in stocks and a 2.8 percent increase in daily average demand—to 6,805,000 barrels. Hence, this increased stock level is justified on the basis of rising demand.



A further increase in crude petroleum demand is expected this year, amounting to a daily average rise of 1.4 percent.

Kerosine stocks were down slightly, 1.3 percent, from last year. Yet, they were equivalent to 76 days' supply as compared with 77 days the previous year. During 1952 stocks were boosted from 27,088,000 barrels at the close of 1951 to 27,490,000 barrels, or 1.5 percent, as a 2.6 percent upsurge in daily average demand sent that figure to 360,000 barrels from 351,000 barrels the previous year.

Again, at the close of 1952, motor fuel stocks were the only major product stocks at relatively lower level than a year ago. Stocks totaling 136,695,000 barrels, up 1 percent from 1951, were good for 42 days' supply at the prevailing demand rate. Stocks of motor fuel at the close of 1951 were equivalent to a 44-day supply.

Stocks of Crude Petroleum in U. S. By Grades, at End of December

(Based on Weekly Reports of U. S. Bureau of Mines)

(THOUSANDS OF BARRELS)

GRADE or ORIGIN	Dec. 29, 1951	Dec. 27, 1952	Changes 1951-1952
Pennsylvania Grade	1,881	2,169	+ 288
Other Appalachian	1,875	1,785	— 90
Lima-Michigan	589	615	+ 26
Illinois-Indiana	11,350	10,058	— 1,292
Arkansas	2,911	3,213	+ 302
Kansas	10,574	10,008	— 566
Louisiana	13,737	15,451	+ 1,714
Northern	2,803	2,342	— 461
Gulf Coast	10,934	13,109	+ 2,175
Mississippi	3,330	3,060	— 270
New Mexico	7,369	7,427	+ 58
Oklahoma	30,316	26,755	— 3,561
Texas	124,082	133,643	+ 9,561
East Texas	14,609	11,343	— 3,266
West Texas	53,926	61,156	+ 7,230
Gulf Coast	26,345	26,452	+ 107
Other Texas	29,202	34,692	+ 5,490
Panhandle	4,241	3,127	— 1,114
North	9,436	7,882	— 1,554
South	5,746	6,409	+ 663
Other	9,779	17,274	+ 7,495
Rocky Mountain	13,223	14,431	+ 1,208
California	29,821	31,462	+ 1,641
Foreign	5,379	8,633	+ 3,254
Total U.S.	256,437	268,710	+12,273

Stocks of Major Petroleum Products Held By Refining Companies in the United States at End of December, 1952, Compared With 1951

Stock at refineries, at bulk terminals, in transit and in pipe lines. Data for 1951 from Bureau of Mines monthly reports: for 1952 from weekly reports of American Petroleum Institute.

(THOUSANDS OF BARRELS)

DISTRICT	Finished and Unfinished Gasoline		Kerosine		Distillate Fuel Oil		Residual Fuel Oil	
	1951	1952	1951	1952	1951	1952	1951	1952
East Coast	24,991	31,360	8,801	12,562	26,637	37,277	10,381	12,466
Appalachian	4,096	5,939	787	812	1,141	2,248	823	877
District 1	2,709	4,006	513	499	821	1,648	562	640
District 2	1,387	1,933	274	313	320	600	261	237
Ind., Ill., Ky.	28,500	29,293	5,146	5,983	15,892	18,447	5,715	5,117
Okla., Kans., Mo.	13,698	14,646	1,567	1,592	9,957	11,638	1,789	1,523
Inland Texas	4,799	5,543	411	455	1,710	1,943	1,126	1,032
Texas Gulf Coast	19,509	18,980	4,488	2,697	12,220	12,349	6,040	7,218
La. Gulf Coast	7,205	7,407	2,330	2,089	3,328	4,121	1,886	1,795
Ark., La. Inland	3,200	2,847	720	542	1,031	815	142	184
Rocky Mountains	4,481	4,992	302	384	1,734	1,910	1,111	1,014
District 3	157	168	8	.....	61	62	36	38
District 4	4,324	4,824	294	384	1,673	1,848	1,075	976
California	14,503	14,899	381	374	7,135	11,075	13,050	17,891
Total	124,982	135,906	24,933	27,490	80,785	101,843	42,063	49,117

Oil-Using Units

Continue Rapid Growth

WHILE NO MAJOR LETUP is indicated in the rate of growth of the nation's oil-using units, significant trends are being established. As expected, the immediate postwar years saw the inevitable rise of five groups —motor vehicles, railroad diesels, natural gas consumers, farm tractors, and home oil burners.

With the end of World War II and its attendant gasoline rationing and lack of automobiles, the 31 million motor vehicles in use at the close of 1945 rose significantly to 53 million at the close of last year.

The upsurge began in 1946 which closed with 11 percent more vehicles in operation than at the same time the previous year. The rate of annual increase slipped to 9.9 percent in 1947 and 8.7 percent in 1948 before bouncing back to 8.8 percent in 1949 over 1948 and to 10.1 percent in 1950 over the previous year. In 1952, the growth rate declined to 2.1 percent from 5.5 percent at the close of 1951.

The fluctuating rate of growth from 1946 to 1952 resulted in an average annual rise of 8 percent for the seven-year period. The trend which has developed indicates only a slight percentage increase for 1953 as the volume of motor vehicles in operation moves past the 53 million mark.

The war-end increase in the use of railroad diesels has continued with only slight abatement. The 4400 of these units in use in 1946 was 15.8 percent more than during the previous year. The rate of growth continued through 1948, when it marked up a 39.7 percent rise in one year. These units numbered 20,600 at the close of 1952—18.4 percent more than the year before.

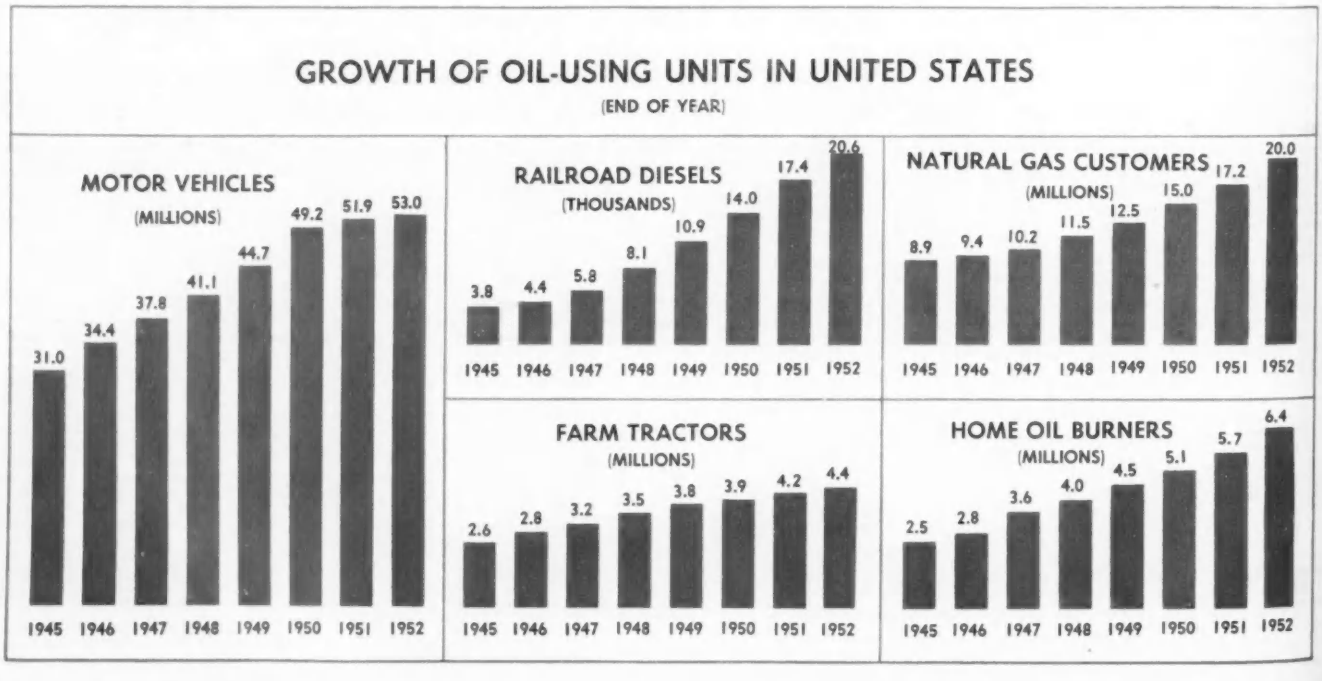
This trend resulted in an average annual increase of 27.6 percent from 1946 to 1952. The percentage rise indicates a slackening in growth for the immediate future, as the number of units placed into use rises.

Thanks to a spreading network of natural gas transmission lines which are opening markets in the Midwest and East, the number of natural gas customers increased 11.1 million from 1945 to the close of 1952. Percentage-wise, this number experienced its greatest increase during 1950. That year 2.5 million new users were added to the 12.5 million customers accounted for the previous year—an increase of 20 percent. While the volume is steadily increasing, the percentage rate of growth declined to 14.7 percent in 1951, but rose last year to 16.3 percent under the steady impetus of new-home constuction.

The markets opened to natural gas from 1945 to 1952—and the promise of more to come—indicate that no new markets will need to be sought immediately. The gas transmission industry has its hands full in reaching existing markets which are separated from the natural gas customer lists only by the lack of pipe lines.

That mechanization of the nation is continuing at an accelerated pace is indicated also from the rapid growth in the use of farm tractors. In 1945, only 2.6 million tractors were in agricultural use; in 1952, the number had increased to 4.4 million.

The greatest rate of increase percentage-wise in the use of tractors occurred in 1947.



Steel for Oil

To be Sufficient

STEEL WILL be available in 1953 in sufficient quantity to permit completion of the probable drilling, pipe line construction and refinery expansion programs planned by the petroleum industry, IF—

There is no appreciable increase in the present rate of defense buildup, and

There are no work stoppages in the steel industry.

Should either of these "ifs" become reality there would be a noticeable change in the otherwise optimistic steel supply outlook since warehouse inventories of oil industry steel items were at an all-time low at the start of the year due to the heavy withdrawals required in 1952, and the forecast of steel availability is based on the mills maintaining anticipated production rates.

Over all, the domestic steel industry's capacity in 1953 will be 117.5 million ingot tons, an increase of 8.3 percent over 1952 capacity. Based on estimates by competent steel industry sources, it is indicated mills this year will have productive capacity to maintain shipments of drill pipe, tubing and casing at a quarterly rate of 553,000 tons, or a total of 2.2 million tons for the year. The indicated 1953 shipments from U. S. mills would sustain a drilling program of more than 48,000 wells. Such a rate of shipments would be 33 percent higher than the volume of approximately 1,650,000 tons of oil country tubular goods shipped in 1952 and would be 320,000 tons higher than the previous peak shipments reached in 1951.

Warehouse stocks, however, will remain low in the first part of the year and operators must continue to look for specific sizes, though in most instances industry sources say the delay in filling orders will be reduced considerably. Warehouse stocks are definitely expected to show improvement after midyear.

The outlook for line pipe availability is almost as encouraging. Expectations, based on increased mill capacities in operation this year, are that total line pipe production—of all sizes—will result in shipments to the industry of approximately 3.5 million tons in 1953, a 20 percent increase over 1952 shipments and near the 1950 peak shipments of 3,668,500 tons. In the latter year, 16,120 miles of pipe lines were completed, more than half of which were 16-inch line or larger.

The biggest factor in the line pipe outlook, however, is the demand and

TABLE 1
Petroleum Administration for Defense Distribution of Steel to the Industry
(Tons)

INDUSTRY CLASSIFICATION	1952* Third Quarter	1952* Fourth Quarter	1953 First Quarter	1953 Second Quarter
TOTAL, ALL STEEL	1,740,571	1,132,954	1,765,495	2,095,138
Domestic Operations	1,547,941	1,012,967	1,556,967	1,910,862
Foreign Operations (Ex. Canada)[1]	192,630	119,987	208,601	184,276
Carbon Steel	1,595,003	1,055,506	1,524,905	1,924,755
Alloy and Stainless	145,568	77,488	208,601	170,381
Division by Chief Industry Use:				
Oil County Tubular Goods	574,527	11,559	542,875	545,423
Plate (Line Pipe and Tanks)	840,163	810,813	927,932	1,198,572
Oil and Gas Producing, Total	665,530	92,655	645,246	643,460
Carbon	593,058	92,438	573,039	558,184
Alloy	72,448	205	72,200	85,264
Stainless	24	12	7	12
Natual Gas Prod. and Proc., Total	31,881	46,415	31,271	43,247
Carbon	31,852	42,137	21,185	43,090
Alloy	26	5	83	147
Stainless	3	65	3	10
Gas Facilities, Total	402,732	282,411	340,236	426,227
Carbon	402,718	282,406	339,834	425,673
Alloy	13	2	400	550
Stainless	1	3	2	4
Oil Transportation and Storage, Total	319,768	372,366	313,980	445,248
Carbon	319,660	372,278	313,891	445,093
Alloy	102	86	88	151
Stainless	6	2	1	4
Refining, Total	127,565	152,621	193,881	239,263
Carbon	122,781	148,142	185,437	230,242
Alloy	4,197	4,005	7,750	8,313
Stainless	587	707	694	708
Distribution and Marketing, Total[2]	5,136	4,769	37,107	34,773
Carbon	5,136	4,769	37,107	34,773
Oil Field Machinery and Equipment, Total	187,520	185,994	162,325	220,491
Carbon	119,798	113,600	105,100	145,272
Alloy	67,522	72,135	57,000	74,867
Stainless	200	259	225	352
Maintenace, Repair and Operating, Total	150,647	123,827	141,950	149,032
Carbon	147,748	122,290	138,024	145,647
Alloy	2,545	1,305	3,650	3,165
Stainless	354	232	276	220
PAD Reserve, Total[3]	92,052	56,837	41,077	42,430
Carbon	91,520	47,677	39,362	42,430
Alloy	532	9,160	1,707	0
Stainless	0	0	8	0

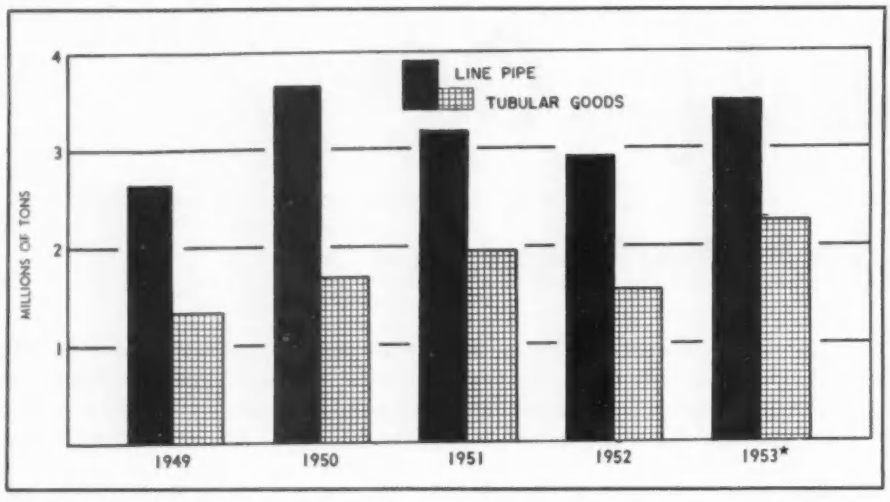
* Figures for the third and fourth quarters of 1952 are for actual PAD authorizations since the steel strike caused deep cuts below normal requirements. Figures for the first two quarters of 1953 are for allotments PAD has received from Defense Production Administration, since not all authorizations had been received in later January.

[1] Figures do not include Canada, since allotments to the Canadian oil industry are made by the Canadian Department of Defense Production from a defense allotment for all industries.

[2] For third and fourth quarters of 1952 authorizations for foreign distribution and marketing are included in the overall figures for oil transportation and storage. The figures were listed separately by PAD for the first time in tabulations for 1953 quarters.

[3] PAD reserve includes, for each quarter, the 22,220-ton set aside of oil country tubular goods for emergency purposes.

SOURCE: Petroleum Administration for Defense.



availability of large diameter pipe. The sizes of 16 inch and above are produced from plate, the steel item most in demand for military and defense needs. To date output of large diameter line pipe has averaged only slightly better than half potential capacity of approximately 800,000 tons per quarter due to the shortages of plate. New steel production facilities in 1953 will result in a higher plate output, though whether additional plate will be available for line pipe production depends on what the military buildup program will be under the Eisenhower Administration.

Military usage of steel, based on allocation by Defense Production Administration, has declined steadily from a quarterly rate of 2.4 million tons in the third quarter of 1952 to barely more than 2 million tons for the second quarter of this year. Under the "stretch-out" defense program of the previous administration, the latter was scheduled to be the rate of steel requirements for subsequent quarters in 1953. A small increase in military usage of plate, though, would curtail a critical item needed by the oil and gas industry.

The indicated encouraging steel outlook for the petroleum industry is further enhanced by three important trends:

- A definite softening in demand for imported pipe in recent months. Some importers now take orders for delivery in current quarters, though prices quoted are still in the range of 100 percent over domestic pipe.
- Some decline in demand for conversion tonnage, though this volume still constitutes a sizeable portion of current deliveries.
- The substantial boost in allocations of steel to the oil industry for the second quarter of this year over that allotted for the first three-month period, increasing the total steel supply under the Controlled Materials Plan to 2,095,138 tons, a rise of 18.7 percent. (See Table 1 for detailed breakdown.) A noteworthy point is the jump of 26 percent in the allocations of heretofore tight carbon steel of all types to 1,924,755 tons for the quarter and the 29 percent increase in the supply of plate to be set aside for oil industry use in the form of large diameter line pipe and storage tanks.

While the industry is still faced with some carry-over orders from 1952 that could not be filled because of the steel strike, PAD officials estimate that unused tickets for steel will be in complete balance by midyear.

Of importance to the domestic steel situation is the decline in needs of operators outside the U. S. for steel produced in this country for petroleum operations. PAD estimates that slightly less than 50 percent of total demand for oil country tubular goods for use in areas outside the U. S. and Canada will be supplied from U. S. mills in 1953. Previously under CMP, only about 30 percent of the necessary drill pipe, tubing and casing for foreign operations were procured from sources outside the U. S. The Western Canadian oil industry, however, due to its remoteness from European supply sources during 1953 will continue to depend on the U. S. for about 90 percent of its oil country tubular goods.

TABLE 2

Petroleum Industry Allocations of Copper and Aluminum

(Pounds)

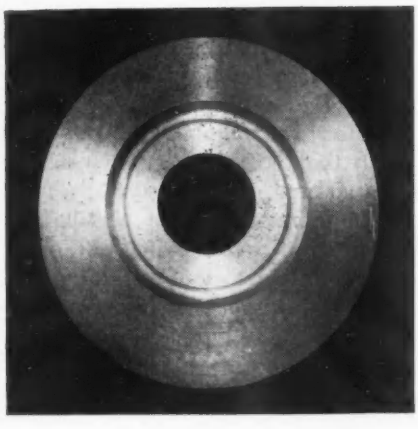
INDUSTRY CLASSIFICATION	1952*		1953	
	Third Quarter	Fourth Quarter	First Quarter	Second Quarter
INDUSTRY TOTAL:				
Copper	9,856,558	9,504,317	11,126,000	9,811,200
Aluminum	1,279,058	1,588,185	1,820,000	1,437,000
Oil and Gas Production:				
Copper	1,533,890	1,414,211	1,474,938	1,403,395
Aluminum	227,099	164,129	297,974	324,619
Natural Gas Producing and Processing:				
Copper	352,836	341,199	419,500	484,380
Aluminum	22,817	60,738	54,000	87,060
Gas Facilities:				
Copper	846,815	577,538	677,000	589,130
Aluminum	68,811	124,576	78,000	74,700
Oil Transportation and Storage:				
Copper	479,856	353,439	480,079	508,238
Aluminum	35,952	23,647	86,200	103,954
Refining:				
Copper	4,277,320	4,217,652	5,142,983	4,799,657
Aluminum	281,198	464,511	343,586	306,979
Distribution and Marketing:†				
Copper	15,984	48,468	85,500	71,400
Aluminum	5,775	904	6,240	6,688
Oil Field Machinery and Equipment:				
Copper	2,349,857	2,551,710	2,505,000	1,927,000
Aluminum	607,406	749,680	780,000	532,000
Maintenance, Repair and Operation:				
Copper	5,526,940	3,787,479	4,622,577	4,306,256
Aluminum	156,987	141,443	241,600	200,908
PAD Reserve:				
Copper	228,712	117,992	319,000	28,000
Aluminum	15,875	35,505	174,000	.....

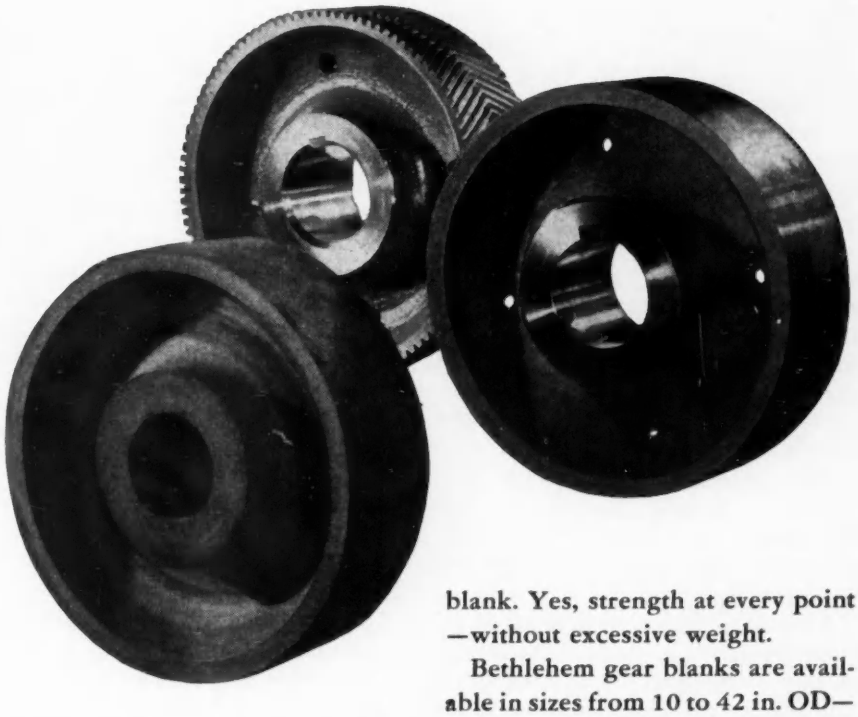
* Figures for the third and fourth quarters of 1952 are actual PAD authorizations. Figures for the first two quarters of 1953 are for allotments to PAD by Defense Production Administration, since not all authorizations had been issued by late January.

† For the third and fourth quarters of 1952 authorizations for foreign distribution and marketing are included in the overall figures for oil transportation and storage. The figures were listed separately by PAD for the first time in 1953 quarters.

SOURCE: Petroleum Administration for Defense.

YES, IT IS POSSIBLE...
HIGH-STRENGTH GEAR BLANKS without EXCESSIVE WEIGHT





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Will the Growth of Middle East Oil Revive International Compact Talk?

Here are some questions and answers on the colossus of the east . . . a possible threat to the structure of the entire industry.

By RAY L. DUDLEY, Publisher,
and **ROBERT E. SPANN,** WORLD OIL Staff

WHEN, ON MAY 26, 1908, the predecessor of the Anglo-Iranian Oil Company brought in a well at Masjid-Sulaiman (Temple of Solomon) in Khuzistan Province, Persia, as it was known at the time, there began gradually to be released from the bottle a genie which today has gathered into its hands the power to serve or destroy the oil industry.

Every American oil man from roughneck to company president, every oil company and every one of its employes in other lands has a stake in seeing that the genie serves and does not destroy. Even governments and citizens with no oil affiliations have a like interest.

The genie is known as Middle East Oil and the thin wisp released in 1908 has already become in 1953 an overpowering giant, growing daily in potentiality.

How to make it serve instead of destroy is occupying much thought now. Action of one sort or another surely will follow. Will that action be in the nature of a joint effort between nations and the oil industry? Or will it find itself expressed in more and more tariff walls?

For today the area known as the Middle East holds over 50 percent of the proven oil reserves of the world and probably 70 percent of the world's indicated reserves. And discovered with less than a fourth of the number of wildcat wells drilled in almost any county you can name in Oklahoma or Texas. The reserves eventually will amount to a great deal more. And that is a fine piece of understatement!

This oil today, like oil in almost any part of the world where it is produced, is carrying part of the governmental expense of the producing countries. Thus, it is a vested interest which brings into play not merely the self interest of the oil companies developing it, but the self interest of the governments themselves. This is true whether a state legislature in Texas or a Middle East ruler is involved. And those interests are not always compatible.

Iran Takes Over. Two years ago, as a result of the decision of one country to void a contract and "nationalize" its oil, the rest of the oil world was called upon to deliver an additional 700,000 barrels daily to the peacetime markets of the Western World. Fortunate for that world, it was at peace!

Delivery was made through the cooperative efforts of 19 American oil companies, acting under special immunity from the U. S. Department of Justice, and in harmony with two important British companies.

No Iranian oil has moved to market in almost two years. Iran is restive.

As this is written efforts of an extraordinary nature are being made by three governments and a number of oil companies to solve the immediate Iranian problem. But only the immediate problem in Iran is the subject of these efforts. And whether the difficulty is solved or Iran decides to go it alone, the big problem remains.

Attempt That Failed. Threat of a flood of Middle-Eastern oil was one of the causes of an attempt to develop an international oil agreement several years back. The plan found staunch supporters and bitter enemies. The independent producer portion of the American oil industry generally was not in favor of it.

Generally, the large companies having interests abroad favored it, although one major oil company, at that time just getting into foreign production, was very much against it. The plan failed to go through. Roughly, the international treaty between the U. S., Great Britain and other countries, originally would have set up machinery to regulate the output of oil so that no nation could cause an international oil collapse.

The situation in the Middle East could cause a collapse of the oil industry. *It is to nobody's long-range interest—oil producers, refiners, governments, (save Soviet Russia), or consumers—to see such a collapse. But there are those who may not take a long-range viewpoint.*

In theory such a collapse might be warded off by inability of a government pushing such a flood on the market to find either tankers or buyers. The international markets of the world are largely served at this time by less than a score of companies. These companies in turn have customer arrangements with a much larger number of distributors. The less than a score own most of the terminals, tankers and other facilities. In the past this has been a deterrent against flooding the world. Self interest—on the part of both the oil company producing or refining the oil, and of the government receiving the royalty or profit participation in it—has pretty well controlled things.

A notable example of the value of market connections occurred when Mexico expropriated American and British-Dutch oil properties there. This was apparently with the consent if not the connivance of the Roosevelt Administration in Washington. Mexico found it so difficult to dispose of her oil that for a long time little of it went elsewhere than to the two "ban-

dit" nations of the world—Hitler Germany and Mussolini Italy. Iran, too, found buyers scarce.

Iran "Nationalizes." Two years ago the Iranian government "nationalized" its oil industry which seems to be a synonymous term with seizure of the properties. Many do not regard this oil as legitimate oil until payment has been made for it. To others it carries no such stigma, though no move to pay for the properties has been made.

The merit of the dispute between Anglo-Iranian Oil Company and the present government of Iran (all governments change, and with the change frequently comes a change in basic philosophy, as witness both England and the U. S. recently) is not the important consideration. What is important is that Iran has been largely dependent upon oil to pay its expenses. In the eyes of the Iranian government, it is thoroughly justified in what it has done and the oil is its own property, to be disposed of on a sound, or an emergency basis as it sees fit to get operating money.

Within recent weeks Iran, in desperate need for money, found a buyer. During the past year the Iranian government has made mysterious references to contracts it has with Communist-controlled governments. Now there seems to be a supply of tankers developing, available to carry anybody's oil anywhere. What the present maneuverings may lead to, nobody can foretell with certainty. What Iran has done could be done by others, some in the Middle East and some elsewhere.

The contracts currently in effect in the Middle East seem to be satisfactory with the governments there, but war or revolution might supplant a ruler who holds his word in high regard.

Of course, a new ruler by abrogating the agreement made by his predecessor would be taking a considerable chance of destroying his own oil industry which hitherto might have proven a boon beyond compare for his country. But there are those who cannot see very far ahead. From them comes the danger to the world.

'Middle East oil . . . . an overpowering giant growing daily in potentiality'

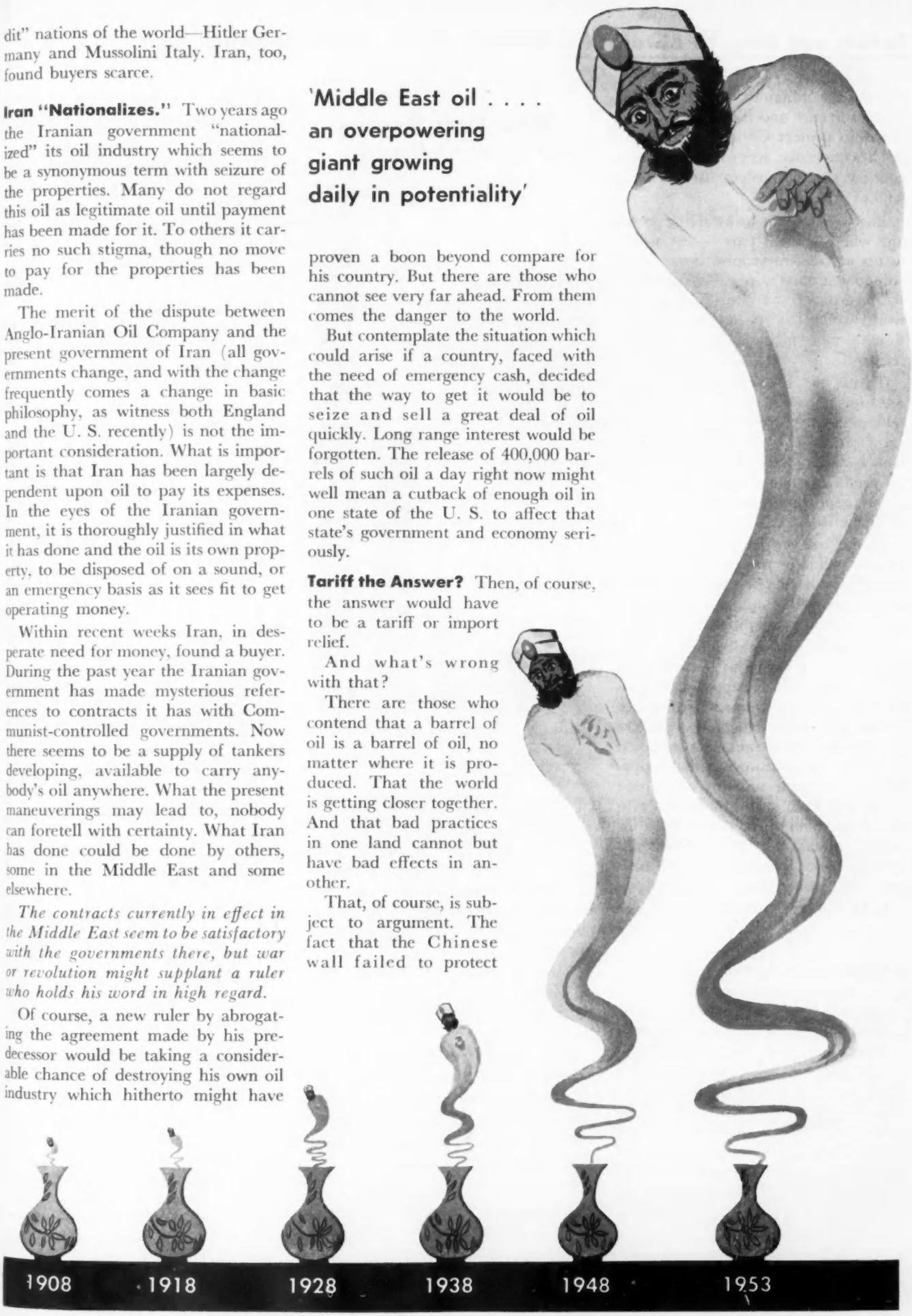
But contemplate the situation which could arise if a country, faced with the need of emergency cash, decided that the way to get it would be to seize and sell a great deal of oil quickly. Long range interest would be forgotten. The release of 400,000 barrels of such oil a day right now might well mean a cutback of enough oil in one state of the U. S. to affect that state's government and economy seriously.

Tariff the Answer? Then, of course, the answer would have to be a tariff or import relief.

And what's wrong with that?

There are those who contend that a barrel of oil is a barrel of oil, no matter where it is produced. That the world is getting closer together. And that bad practices in one land cannot but have bad effects in another.

That, of course, is subject to argument. The fact that the Chinese wall failed to protect



Tariffs not easy to obtain . . . seldom satisfy those desiring them

China, the Maginot Line failed to protect France and the Siegfried Line failed to protect Germany, need not be a conclusive argument that a country cannot protect itself with a wall of any kind.

But we do seem to be living in an age where a great part of the world wants as free intercourse between its component parts as possible, and looks with suspicion on that part of the world which has walled itself off, or, to use a more modern term, curtained itself off.

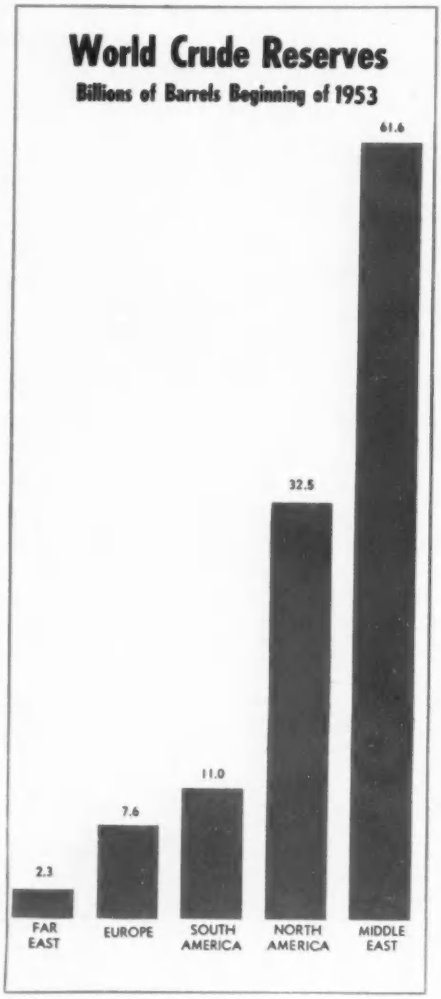
Tariffs, too, it has been pointed out, are not always easy to obtain and seldom satisfy those desiring them. *But tariffs, in the absence of anything else, would have to protect one part of the oil producing world against the other if some of the situations pictured should arise.*

If the answer is to be found in tariffs, will our present or past approaches to tariffs be sufficient? Have we contemplated all the reasonable and practical possibilities in tariffs?

Our tariff now is designed to protect both the domestic industry and the consumer. It is supposed to protect the industry from such a flood of oil as to require dangerous cutbacks in domestic production. It is supposed to protect the consumer in that it does let in a sizeable amount of outside crude. But even at this moment a substantial portion of the domestic oil industry thinks the protection not enough. And representatives of non-producing states want it removed.

What is the alternative? There seem to be two.

A Compact the Answer? One suggested is some sort of international oil compact between governments and the oil industry. Supporters of such a compact say that the situation has grown too big to handle otherwise. They say that not only the industry but governments have a stake in the stability of such an important product as oil. They say that should some international figure arise and, for purely personal or selfish reasons, seize the country's oil through abrogation of contracts, only an agreement between nations, an agreement to which his country was a signatory, could save collapse if the production of the country involved were important enough. A country would think twice, they say, before it violated an international agreement, and long range self interest should be enough to make each country want to become a part of the compact, and have a part in a crude oil allocation.



But can an effective international oil compact solve the problem? Aren't there just too many obstacles? For instance:

Some very experienced minds are equally positive that no practical compact solution *has ever been offered.* There is *need* for a solution to the problem which tariffs *may* not solve, they agree. But

"Is there any assurance that a government, a kind of irresponsible government such as might pose the threat, would abide by its agreement, especially if that agreement had been made by a deposed government or governmental personality?"

"But wouldn't any government be more likely to respect an agreement with other nations above an agreement with individuals? Our government broke an agreement with its own nationals when gold notes were called in, but our government (U. S.) would not break a treaty agreement, would it?" was the reply.

To which a logical answer could be made that treaties between countries have been broken in the past, many of them.

"And wouldn't an international oil compact really strengthen the proponents of nationalization of natural or other resources all over the world?" an inquiring mind asks.

"Not necessarily, at all," seems a logical answer to that since the purpose of a compact would be to protect what is 99 percent a privately operated industry.

"But wouldn't the net effect of a compact between nations be to hold up the price and wouldn't the 'have-not oil' countries, with no long range thinking, bring all pressure possible to bear to hold down prices even at the loss of profits? And couldn't that ultimately mean such low prices that all of the benefits of a compact would be lost to the industry and the world?

"And could it finally become a child of the United Nations—if the United Nations lasts that long?"

God forbid!

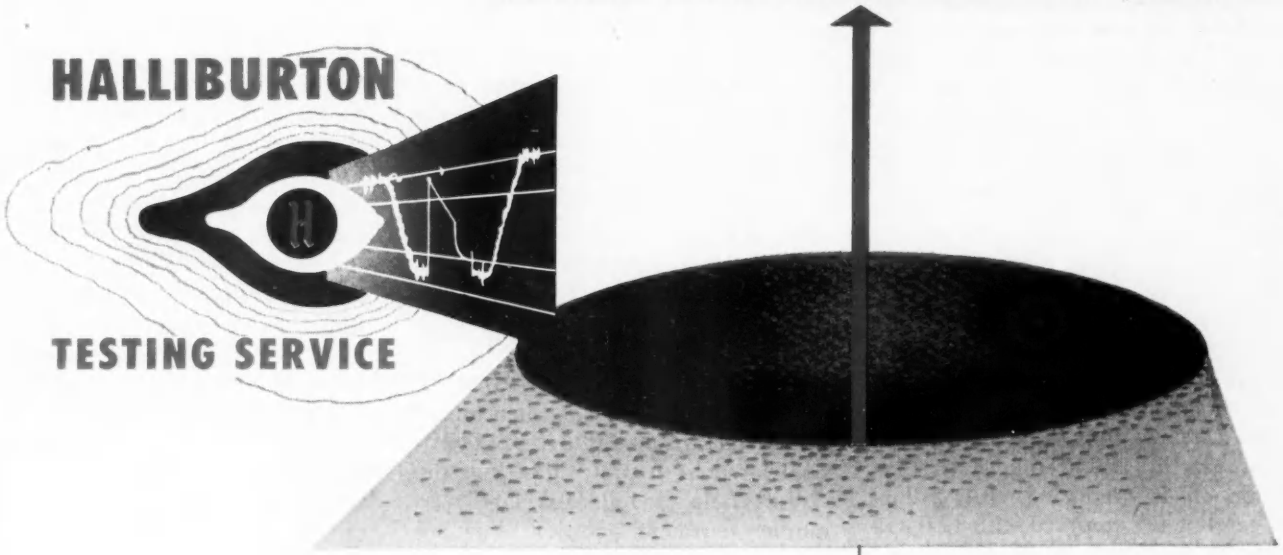
How About the Consumer? What of the consumer, in the case of an international oil compact? Would he be the forgotten man? This is a question which must be satisfactorily answered before a government would have a part in such a compact. We asked the question, too, and were answered:

"The flooding of the world or any part of it with low priced oil would not be of enough immediate benefit to the consumer of oil to offset the after effects which would be bad. It wouldn't benefit him as much as it would hurt him."

"Why?" we asked, and here was the answer:

"With crude oil in the Persian Gulf having a price of $1.75 a barrel, the

MAKES UP STRING WHILE YOU COME OUT OF HOLE



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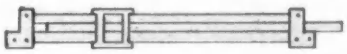

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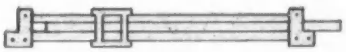

Your Halliburton Tester is a responsible, efficient, and experienced man who knows the importance of the job. He'll stay on the rig giving you his close, full-time, personal attention from start to finish of the test.

Your Halliburton Tester comes completely equipped with the most advanced, highly specialized tools. He'll give you a safe, successful, accurate test on the very first run practically every time.

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Next time a test comes up, be sure to phone your nearby Halliburton Testing Specialist. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

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Y E A R S A H E A D I N D R I L L S T E M T E S T I N G !

A compact written by politicians could work unfair results

generally posted price at this time, the crude oil cost in a gallon of 76-octane gasoline is only about four cents. If the price of crude were cut 75 percent, it still would mean only a cut in gasoline cost, for instance, of three cents per gallon.

"But the consuming public is benefitting from constantly *improving* gasoline (and other petroleum products). By reason of a stable industry, managements of oil companies have spent and are spending hundreds of millions of dollars to make the products better *and to get more products from a barrel of oil.* As a result of this effort today an average barrel of crude oil is producing 18.4 gallons of gasoline as compared with 12.6 gallons 30 years ago, or nearly 50 percent more. And a gallon of today's gasoline does the work of two gallons of three decades ago. (These are figures on U. S. crude.) An unstable oil industry could stop this.

"As a result of a stabilized industry, millions of dollars have been spent and are being spent to find more oil. *That's why U. S. reserves and the reserves of the world, including the Middle East, are greater today by a terrific percentage than they were 30 years ago.* An unstable industry would affect this.

"All over the world people are improving their positions by reason of a dependable oil supply. It is to the selfish interest of the world that the underground reserves be produced in such a manner as to provide the greatest supply.

"And even non-consumers not affiliated with the oil industry have, as has been pointed out, an interest in stability because the part oil is playing in so many countries and states in governmental and domestic economy.

"But wouldn't the entire idea of such a compact run into American aversion to cartels, and be contrary to our idea that competition is healthy?"

The answer to both of the foregoing questions seems to be "yes." But with the qualification that American oil is now in competition with cartel oil, and "foreign" oil produced by American companies finds much, if not most, of its competition from oil handled under cartels—because some countries think cartels are fine. And even in America we have seen some strange things done in the past 20 years. We've seen price umbrellas authorized by the government and held over inefficient concerns.

But it is difficult, if not impossible, to think of an international oil compact without thinking of it being an international cartel in which the U. S. would participate, with price fixing and price protection resulting from it.

"And isn't it true that when an industry starts running to the government for help, it pretty soon gets the kind of 'help' it didn't ask for?" was another pertinent question. The answer to that is easy.

In the oil industry that certainly is true!

Not So Easy! But when you get further into the practical aspects of an international oil compact, it is discovered that the problem of determining what should be in it, of developing the provisions of it which will fill the need for it, and of getting the consent of the necessary compact parties to it—that is something else, indeed!

It is argued that the compact must be between governments, by treaty for reasons already presented. That sounds reasonable.

But a compact written by politicians, or statesmen, whichever are available for the writing, and which does not carry with it the practical knowledge and assent of the oil industry, the big companies and the little ones, could work a multitude of unfair results. So, should the matter actively come to life again, as it well may, the selection of the consultants from the oil industry is of the greatest importance.

And what countries shall be invited in, and to what extent shall they share in a world wide proration plan? In the final analysis that is what it gets down to, and there can be no denying of it. (If Iran today should attempt to sell immediately the 700,000 barrels per day of crude oil she was producing when she seized the Anglo-Iranian Oil Company properties, it would mean the displacement of that much oil which other countries are now producing.) And what of other countries, like Canada, Indonesia and those in South America which, too, are on the upgrade insofar as oil production is concerned?

And what about U. S. anti-trust laws which would have to be revised —or would they? (One of the arguments against the compact when it was proposed a few years ago was that a treaty participated in by the U. S. takes precedence over the laws of the land and that our anti-trust laws would be flouted. There are many who would like to see legislation adopted to the effect that if the provisions of a treaty run counter to our national laws in effect at the time of the making of the treaty the national laws would have precedence, unless the laws were specifically amended to agree with the treaty.

Say the friends of the Interstate Oil Compact here in the U. S.: "It does not control allocations of oil between states. It does not control or affect prices or even fix practices which in turn may regulate prices. It can only recommend practices looking to greater conservation of oil. Its greatest value is in the promulgation of standard practices of conservation."

Advisory Body Not Enough? But on the other hand, say the proponents of an international oil compact: "We cannot have merely an advisory body on conservation. There is a vital need that conservation be an immediate goal of the compact, but here we are dealing with companies from non-cartel countries operating in competition with companies based on cartels. We must realize that there is a difference between the kind of competition and conditions under which our domestic industry operates, and those in which we must operate internationally."

The third alternative is to do nothing, to assume that everything is all right, to believe that even if a country decided to sell a lot of oil at less than cost, it wouldn't mean a collapse. And what is meant by collapse anyway?

("Collapse" as we would understand it means the condition which

would follow the entry onto the market of irresponsible oil to such an extent that competition with it would destroy profits, and, if continued, would, materially and adversely affect the oil industry throughout the world. Those opposed to profits in enterprise would, of course, hail this as a new and glorious day.

(Since definitions are necessary, "irresponsible oil" would be considered: (1) Oil in the hands of those having little knowledge of world affairs, but having an intense need for cash. (2) Oil discovered and made available at the expense of other than the person seizing it and selling it, oil costing the person seizing it little more than loss of reputation.

(At this point is should be said that there seems to be a generally accepted theory in international circles that if a country takes over an industry and pays for it fairly, it is well within its right. The advisability of such action, and the right to do it, are different things. In our discussion of the No. 2 part of this definition, we mean oil not paid for fairly.)

A person might well be forgiven the doubt as to whether there is any practical method of preparing against some of the eventualities which could come about. Those who contend with assurance that nothing will occur are to be praised for having an optimistic nature. But if the Iranian problem isn't satisfactorily solved, they may be reclassified.

What *is* the answer?

Is it a change in U. S. laws permitting oil companies to engage in cartels abroad, and shall international cartels between nationals of different countries be allowed to operate with NO governmental control? Is it some kind of an international oil compact which will attempt to protect the countries in it, and their nationals, the consumers of non-producing countries, and the oil companies which discover, produce, refine and sell oil with an efficiency which no government has, or can ever hope to equal?

Or, is it tariffs?

Or is it just to let things slide and hope for the best without preparation?

Of course, when the ostrich first stuck his head in the sand things were not so bad! And a lot of times when he covered up nothing happened.

But a better alternative might have been to have planned a route of flight.

Remember, this is no threat from an area with a comparatively few billion barrels of reserves as was the case in Mexico, South America, and East Texas. But it is something that will be with us a long time, with length of time complicated by international intrigue, revolutions, wars and natural deaths.

It seems that the least that can be done is to put some constructive thinking into play.

WORLD OIL will be glad to present the constructive views of its readers as to what can or should be done.

State Department, 5 U.S. Firms Discussing Iranian Settlement

Situation poses serious problems of oversupply or production cutbacks.

PARTICIPATION OF FIVE American oil companies in discussions with the U. S. State Department on the Iranian solution is involved in renewed efforts being made to settle the nearly two-year old oil problem. As of February 11, prospects for early settlement did not seem improved.

Topic of the discussions is a method under which Iranian petroleum could be returned to world markets without disturbing the status quo established when oil production in other nations had to be increased to fill the vacuum created by withdrawal of Iranian supplies from markets.

Whether an agreement satisfactory to both the Iranian Government and the dispossessed Anglo-Iranian Oil Company will provide a permanent solution, is uncertain. The possibility, however, that Iranian petroleum in large volumes may again enter world markets poses serious problems of either an oversupply or the need for some cutbacks in other areas.

Active participation of the five American companies in a plan for returning Iranian oil to world markets would require anti-trust immunity from the U. S. Justice Department. Previously such immunity was granted when these and other U. S. companies participated in the 19-company Foreign Supply Committee to help make up the petroleum loss at the time of the Iranian "nationalization." This previous immunity was withdrawn by the Former Attorney General James P. McGranery as one of his last official acts in office.

Possible Courses. It seems probable that, if the Eisenhower Administration pursues the policy of the former administration and continues to inject itself in the oil controversy, something along the following lines may be worked out:

- Iran and Anglo-Iranian Oil Company would submit to arbitration the matter of what would be a fair payment for the Anglo-Iranian Oil Company's expropriated rights and assets in Iran.
- Operation of the oil industry in Iran would be carried on by National Iranian Oil Company (government-owned) under contract with some engineering-management company to be selected by National Iranian. This company would operate on a fee basis and would carry on the operations of both production and refining.
- Contract would be made between National Iranian Oil Company and a "composite" company made up of the five American companies and two British companies, under which the composite company would agree to sell Iranian oil at market prices. Compensation for the sale of the oil would be in a share of the profits involved. Oil used in Iran would not be covered by the agreement. Many variations of the foregoing plan are mentioned.
- Payment to Anglo-Iranian Oil Company would come from National Iranian Oil Company in cash or oil over a period of years.
- Some sort of a loan or advance

The vast Abadan refinery — is it in excellent shape or has widespread looting stripped it of key parts?

in cash reportedly from the World Bank. Presumably this money would be "emergency money" to help tide Iran over until the plan was working.

Some of the obstacles to the settlement of the controversy by this plan may well be the Iranian Government or Anglo-Iranian Oil Company.

There are many unknowns once a possible settlement is reached. For example, would Iran submit to a production limit under capacity for oil to be sold outside the country (to be marketed by the composite company) and agree not to sell any additional oil to other prospective buyers? Would former Iranian Abadan refinery employes, sparked by the intense nationalism of their leaders, submit to orders and directions of European (or American) refinery managers? Would a possible change of government in Iran after agreement is made cancel the former government's commitments? These possibly will have to be listed as "calculated risks" necessary to salvage out of the political mess in Iran, a nation still loyal to the Western World and not another captive satellite nation of the Russians.

Involved in the settlement of the Iranian oil problem is the largest refinery in the world at Abadan, a plant with capacity for more than 500,000 barrels daily; a small refinery of 2300 barrels per day at Kermanshah; complete loading facilities at Abadan capable of handling 200 tankers a month; eight producing oil fields with a total of 87 producible wells, which before "nationalization" had reached a peak output of 731,000 barrels daily; a pipe line network totaling 1020 miles comprised of lines ranging in size from 3 to 22 inches; a tank farm at Abadan of approximately 15 million barrels capacity and an underground crude oil reserves estimated by WORLD OIL at 13 billion barrels—probably an extremely conservative figure.

There is considerable difference of opinion as to how long, after an agreement is reached, if indeed it should be made, Iranian oil will start coming into world markets. Placing any agreement into effect may take a few months. After that crude oil in heavy quantities can start coming into the market immediately after the properties move into operation. On this all authorities seem agreed.

Refinery Picture. But for refinery operations, that's a different story.

Anglo-Iranian was employing about 2500 British specialists out of a total of approximately 70,000 employes in Iran. Approximately 1500 of these technicians were in refinery operations. This makes rather absurd the estimate of one American that 15 to 25 American technical men could run the refinery with present Iranian employes.

Prior to moving any Europeans or Americans into Abadan, even for a preliminary survey of the plant's condition, sanitation engineers would be required to make a check on the water supply and other facilities that probably haven't been kept up since the Anglo-Iranian personnel departed.

Assuming these conditions could be corrected in short time, it is thought that the refinery could be placed back on stream in small volume within six months if a survey of the plant (which may take several months) found the equipment in order, and replaced missing or defective parts.

Reports on the present condition of the refinery vary considerably. One is that it is in excellent shape. Another is that looting has been widespread, and that mercury from instruments has been sold all over Iran. This report states that much brass and copper tubing is missing. The plant has been closed for nearly two years and, of course, a close inspection would be required.

Informed sources estimate that to put the entire plant back into operation would require two years. Whether the full capacity of the plant would ever be needed again is uncertain.

Estimates vary as to how much Iranian petroleum will be channeled into world markets. Some oil officials estimate that possibly a volume of 250,000 barrels daily could be absorbed without serious consequences, though some cutbacks would be necessary. Those close to State Department officials have hinted that Iran will have to market approximately 400,000 barrels daily (either crude oil and/or products) for economic survival.

Here's a formula for Safety

$$S = PB \int \left[n + \left(\frac{\quad}{\quad} \right)^{n} + * + \right] d\$$

$\$ \rightarrow min.$

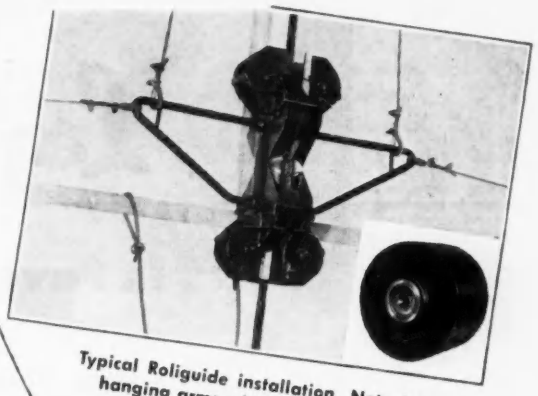
Where S is the Safety you want on your rig, PB is your constant assurance of quality oil field products.

is the rigs throughout the world already protected by PB,

is a PB Wire Line Guide, and

are the draw works and crown blocks on these rigs that take the beating from whipping line,

is a rubber roller that contacts the line and dissipates the dangerous shock and vibration.



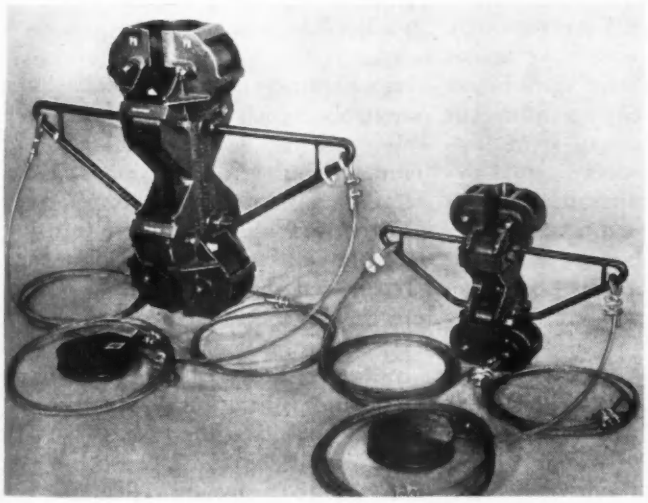
Typical Roliguide installation. Note length of hanging arms which provide proper stabilization. Inset, right, Replacement Roller.

PB WIRE LINE GUIDES

...prevent wire line wear
...protect your rig

PB Wire Line Guides absorb the dangerous whip, lash and traveling waves in the drilling line... prevent excessive wire line wear, uneven spooling and pile-up on the drum... and protect the fast sheave of the crown block. Your crew, rig and drilling investment are safer when protected by PB Wire Line Guides.

Both PB Standard and Roller Type Guides utilize the same dampening principle to stop wire line vibration. Rubber stabilizing elements or rollers absorb the vibration which is then dissipated through the rugged guide body to the hanging assembly. You're assured a straight, steady length of wire *through which waves cannot travel.*



ROLIGUIDE, left, is a heavy-duty roller type guide for deep wells. Handles lines to 1½" in diameter at high line speeds. ROLLETTE, right, for all average depth drilling, features the same design and construction as the larger ROLIGUIDE. Replacement rollers of solid, long-wearing rubber, with integrally molded roller bearings and housing are available on order.

SOLO is a smaller guide which contains one rubber stabilizing element. SOLO is specially designed for small rigs and shallow well drilling. Sold only as shown above, without hanging lines.

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QUARTET is a Standard Guide containing four rubber stabilizing elements. It has sufficient weight to minimize wire line whip and vibration on all but the largest derricks. Delivered with hanging lines.

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Legislative Outlook

Is Favorable to Industry

By L. DAN JONES,
Assistant General Counsel
Independent Petroleum Association of America

PETROLEUM—both oil and gas—will not go unnoticed by the new Republican Congress any more so than by preceding Democratic ones. Its prominence as an indispensable element in our economy invites attention. Its absolute essentiality to national security demands it.

There is unquestionably a general feeling and expectancy of an improved atmosphere to be forthcoming from the new administration and new Congress. This stems from a genuine and widespread belief, reflected in the ballots last November, that our national government's course of action abroad and at home requires orientation, adjustment or more positive direction—and that the Eisenhower administration can provide what is needed.

Based upon these assumptions of broad improvements, industry generally is expecting that the attitude of government and the atmosphere it will provide will offer better conditions under which to function. First, it is expected that a sounder fiscal policy will be followed, which will be conducive to a more stabilized economy. Second, it is expected that there will be a trend away from bureaucracy, with less unnecessary governmental interference with individual and industry activities.

These improvements should, in a general way, reduce legislative activity. From this standpoint oil, along with all other industries, might expect less Congressional involvement.

As to oil specifically, its place in the new Congress depends in large part on how well the industry is able to meet its responsibilities in fueling our economy. Its immediate duty is to the day-to-day welfare and comfort of the American people, who have become dependent upon oil for the heating of their homes, transportation, and a myriad of other uses. A paramount current responsibility, however, lies in meeting the requirements of the defense program—in assuring the national security.

Fortunately, as to the responsibility for current requirements for peacetime uses, there seems to be no problem. The domestic industry is capable of meeting all current demands. We are not faced with an oil shortage. This should mean less short-range concern on the part of Congress and fewer investigations and stop-gap legislative proposals.

The adequacy of productive capacity of the domestic petroleum industry for an all-out war, however, is another matter. Present capacity is not enough. On this industry and government agree. Just how much we should have over and above current needs has not been prescribed by anyone in authority. It should be. Someone with governmental defense program responsibility should set the goal. The industry should know what is expected of it. Then, everybody concerned could set out to do the job.

Adequacy for Security

At the beginning of World War II we had about 1 million barrels daily productive capacity available over and above current requirements. Because of the greatly increased use of oil since 1942, we need today almost twice that amount to be in a comparable position.

The Western Hemisphere Oil Study Committee of the Independent Petroleum Association of America has recently completed a study which points up the seriousness of the "adequacy" position of the domestic industry from the point of view of national security. This study shows that the industry has the ability to accomplish any reasonable goal of reserve productive capacity that might be set. It further shows, however, that under governmental policies in effect in recent years the industry's ability is being sapped, with the result that expanding productive capacity will not keep pace with defense needs unless the errors are corrected. If these findings are correct, the industry is faced with serious problems that very likely will lead to a multiplicity of congressional activity.

This study shows that at present the industry is not receiving sufficient income with which to carry on drilling activity and other operations on a scale large enough to provide the needed expansion in productive capacity. The income to the industry is being restricted by two factors: First, by unrealistic and inequitable price controls, which have continued over the past two years; and second, by the continuing increase in imports of foreign oil. Both of these impediments to the very ability of the industry to do the job now facing the Nation have been the outgrowth of governmental policies. As to price controls, the Office of Price Stabilization has continued controls over petroleum without justification. Oil has been in ample supply. There has been no threatened shortage. There has been no need to control oil prices. With respect to imports, under the Trade Agreements Program the government policy has been one of encouragement. As a result, imports have continued to increase for many years and are doing so today at a rapid rate.

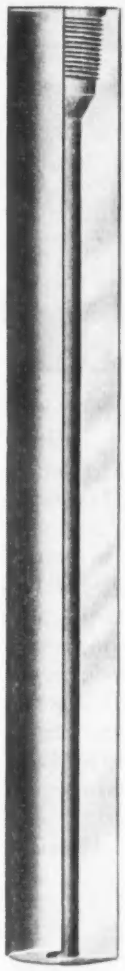
In this problem of adequate productive capacity, vital economic factors are involved. Such factors at play, with respect to so strategically essential a commodity as oil, at such a crucial time, almost inevitably will result in drawing the attention of

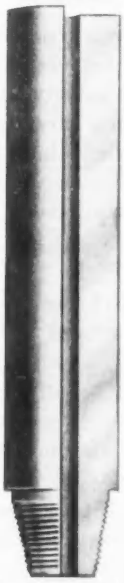
Use these Helpful Facts to insure maximum Drill Collar Performance!

A Drill Collar is one of the most deceptive of all drilling tools. It looks so simple—just a hollow bar of steel. But a good Drill Collar contains more hidden qualities . . . more years of "know how" ...more testing, checking and rechecking than probably any other drilling tool—certainly far more than most oil men realize!

Most oil men know the importance of a straight, concentric bore in a Drill Collar—and you get this in every Baash-Ross Drill Collar. In fact, Baash-Ross Drill Collars are held to wall-thickness specifications so rigid that, for a 2-1/4" bore or larger, *the wall-thickness cannot vary more than 1/16" for each 10 feet of product length!* And overall straightness of each Baash-Ross Drill Collar is held to unusually close limits, too—*within 1/8" of absolute true over the entire length!*

But probably the most important points in long life and top Drill Collar performance can't be seen. They have to do with the metallurgy and heat-treatment of the steel itself—*and they are vitally important.* To insure maximum returns from your Drill Collar investment, remember the three important points outlined at right.





Bottom connection can be pin (above) or box (below).

Available Through Leading Supply Stores

First

. . . in selecting the steel to be used in a Drill Collar, chemical specifications alone are not enough!

For example, simply specifying that a Drill Collar be made of a certain AISI specification steel—or any emergency substitute—permits far too great a variance of alloys to obtain uniform physical properties in the finished product.

Alloys that produce uniform properties when used in small cross-sections produce entirely different sub-surface properties when used in a thick-walled Drill Collar. Therefore, the steel used in Drill Collars should be selected by the "hardening characteristics" as well as by chemical specification.

Baash-Ross does this by checking the "End Quench Hardenability" index of each individual heat of specified steel to determine exact hardening characteristics. Then, based on this test, each heat of steel is separately classified as to the size of product cross section that particular steel is to be made into to secure the desired uniform physical properties in the finished product.

Thus, Baash-Ross assures each Drill Collar having accurately-controlled sub-surface as well as surface physical properties. Repeated re-cuts can be made on the threaded ends without sacrificing thread strength or hardness!

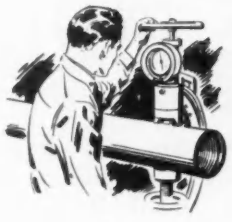
Second

. . . specifying that the Drill Collar should be heat-treated to a certain hardness is not enough!

The really important thing is how the Drill Collar is processed—how it is heat-treated to develop its best physical properties.

Through years of experience, Baash-Ross has learned that these processing steps are quite critical and must be accurately controlled to produce a Drill Collar free of structural defects and residual stresses. First, the bar is normalized and tempered over its entire length in one operation to produce a stress-free homogeneous structure with the desired physical properties.

After the bar has been machined to the specified outside and inside dimensions, each end of the Drill Collar is again treated by an oil quench and tempering operations to produce the required uniform physical properties necessary for the threaded end zones.



Thus, a Drill Collar is produced that is free from residual stress to assure sustained straightness—with high impact values to resist shock loading—and with the end zones of such uniform physical qualities as to permit repeated recutting without reduction of original joint strength!

Third

. . . specifying the size and type of joint desired on the Drill Collar is not enough!

Almost any machine shop can cut joints that will reflect proper gage standoff and will thread together. But the important thing is whether the joint is machined to obtain its full designed efficiency. Joints that are not produced with accurate thread form, lead and taper will permit wobble and cause failure. Furthermore, joint alignment in Drill Collars is particularly important because the rigidity of these members concentrates mis-alignment stresses on the threaded connections and is the most common cause of joint failure in Drill Collars.

Baash-Ross asures accurate thread form, lead and taper in every joint by a prescribed method of checking and gaging that goes far beyond standard gaging standoff tests. Then the alignment of every joint is precisely checked with a Baash-Ross Alignoscope* to assure its not varying by more than 1/10 of 1% of theoretically perfect with respect to the longitudinal axis of the Drill Collar—virtually perfect alignment!

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For additional data on the many rigid specifications used in manufacturing Baash-Ross Drill Collars, see the Drill Collar pages in the Baash-Ross section of your latest Composite Catalog. Or write direct!

Congress and in legislative proposals seeking a solution that will assure the future security of the nation.

One aspect of the "adequacy" question is the problem of imports. The effect of the current rate of imports upon the domestic industry's ability to do the job the nation demands is almost certain to receive attention of the new Congress. If not presented otherwise, the matter is very likely to be brought to a head before Congress in connection with the extension of the Trade Agreements Act, which expires in June.

Already there has been widespread and apparently concerted effort made to arouse public sentiment aimed at the extension of the Trade Agreements Act. This is being done under the slogan "Trade, Not Aid." The stated aim of this movement is to further reduce U. S. tariffs and other trade restrictions; and to further lower the standards of the safeguards in the present law designed to give relief to American labor and industry when threatened by excessive imports of foreign goods.

On the other hand, there are numerous elements of the domestic economy which feel that the Trade Agreements Act confers entirely too broad authority upon the executive and that the time is here when it should be narrowed. A bill already has been introduced which would require all agreements be approved by Congress.

The present law provides the so-called "peril point" procedure whereby the Tariff Commission determines the low point below which tariffs may not be cut without danger of injury to American industry. Some groups have not been satisfied with the administration of this provision. For example, last year in connection with the renegotiation of the Venezuela Trade Agreement the Tariff Commission rendered quite a favorable decision to domestic oil producers, to be totally disregarded by the President. Other domestic groups have had similar experiences.

The present law also provided "escape clause" relief to American labor and industry where there is injury or threatened injury. There also has been much dissatisfaction with the administration of this provision. It can be expected therefore, that an effort will be made on the part of domestic groups to strengthen these safeguards.

About the Author

L. DAN JONES, assistant general counsel of the Independent Petroleum Association of America, Washington, D. C., has been with that association since his release in 1946 from service with the Army in artillery. Before World War II he was an attorney for Indiana coal producers in Terre Haute, Ind. Jones was graduated from the University of Oklahoma in petroleum engineering and later received his law degree from George Washington University in Washington, D. C. He was admitted to the District of Columbia Bar in 1939.

On the other hand, an advocate of the "Trade, Not Aid" philosophy recently proposed that the present safeguards are too protective. As a new governing criteria, he propounded that a domestic industry producing as much as one-half of domestic requirements should be *per se* held to be suffering no injury.

The expressed program of the new administration to readjust and balance the federal budget no doubt will be accompanied by a variety of tax proposals during the life of the new Congress. We have already seen several, and more are sure to follow.

Of particular importance to the oil industry is the absence of any indications that there will be a renewal of the attacks upon the basic tax structure of the industry; that is, the percentage depletion provision and the option to expense intangible drilling costs. The successful defense of the attacks of recent years has served to strengthen the industry's position. There has resulted a better and more widespread understanding of the essentiality and justification of these tax provisions. There is less and less acceptance of the emotional appeal—rather than one of logic—that has been the basis of these attacks.

There is a general feeling of wait-and-see with respect to the scope and direction of the reforms and new programs of the new administration. With this attitude many matters which normally might be initiated will be held in abeyance. There are two specific oil tax problems which need legislative attention but may fall in this "wait-and-see" category. First, there is the 50 percent limitation on depletion which operates to defeat its very purpose, especially as to stripper or marginal operations. Second, Section 122 of the Internal Revenue Code, which contains the carry-forward and carry-back provisions, when applied to oil, reduces or eliminates in many instances the effect of the depletion provision. This provision was designed to apply to all industries. Its effect when combined with depletion is to discriminate against the oil industry. Here are two separate provisions of the tax laws, each designed for a specific and independent purpose, but when applied in combination to certain type operations in the oil industry and other natural resource industries, particularly the smaller elements, serve to offset or nullify each other.

Public Lands

There is a growing feeling that federal ownership of land in the U. S. has grown to such extent that it requires careful review and consideration. The federal government now owns about one-fourth of all land in the U. S. This presents a serious tax problem to many local governments and is of interest to the oil industry because of its effect upon development of natural resources.

A matter that has already been presented to the new Congress is a proposal to amend the Mineral Leasing Act by eliminating the present waiver of second and third year rentals on public lands leases. This same proposal passed the House last year but was not acted on by the Senate.

Another matter that was introduced last session and may come before the present Congress is a proposal to increase the acreage limitation on oil and gas leases permitted to be held by a single lessee in any one state.

The pending large scale proposals for the importation of natural gas from Canada may, in at least some aspects, come to the attention of Congress.

Exploration Record

Continues Upward Trend

By **CECIL W. SMITH,** WORLD OIL Staff

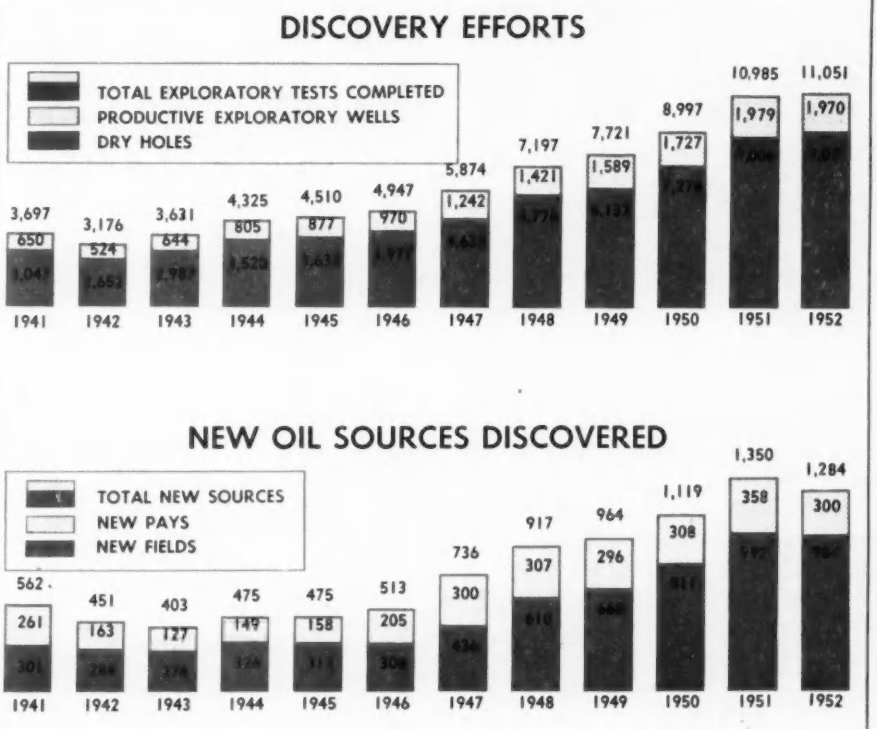
THE GREATEST exploratory drilling activity in the history of the industry took place during 1952. Never before in a single year have as many wells been drilled in search for new oil and gas. For the second straight year wells in this classification totaled more than 10,000, and continued the always upward exploration trend started 11 years ago. Since 1941, with the start of World War II, each year has seen activity increase from less than 3200 tests to the present 11,066.

The year's increase in operations over those recorded in 1951 was, however, not very large. The upward trend that has continued 11 years without a break was maintained by the scant margin of 84 wells or 0.8 percent. However, the margin of difference would have been much greater had not the campaign just completed been plagued by severe shortages of tubular goods occasioned by the mid-year steel strike.

The 84 more exploratory tests drilled in 1952 than in the previous year were all dry holes; in fact nine others were also dusters. In other words, there were 93 more dry holes and nine less producers drilled. Percentagewise, producing wells figured 17.8 percent of total drilled in 1952, while in the year before operators managed to complete 18 percent successfully. The 1952 record was the lowest since the 1943 exploratory campaign, which could do no better than 17.7 percent. Exploratory successes amounted to 19.2 percent of the total drilled in 1950, and 20.6 percent in 1949. The highest in the past ten years was recorded in 1947, when 21.1 percent of the over-all were producers. Since then the producer-to-dry hole ratio has gone steadily down. It appears that the deficiency in successful hunting must continue to be made up by more numerous tests.

Of the 1970 successful exploratory tests drilled last year, 1624 opened new pools to production. The remaining 346 proved major extensions to existing pools. The new pool openers fell short of the 1662 credited to 1951 and it was the extension wells that almost made up the difference.

New crude pools found during the year totaled 1284, considerably under the 1350 discovered in 1951. The year's



YEAR	Total New Oil, Gas and Distillate Sources Found			New Oil Sources Found			New Gas Sources Found			New Distillate Sources Found		
	Total	New Fields	New Pays	Total	New Fields	New Pays	Total	New Fields	New Pays	Total	New Fields	New Pays
1937	376	239	137	322	203	119	48	33	15	6	3	3
1938	423	264	159	373	229	144	42	31	11	8	4	4
1939	473	258	215	414	224	190	55	33	22	4	1	3
1940	492	309	183	428	261	167	62	46	16	2	2	0
1941	650	362	288	562	301	261	83	58	25	5	3	2
1942	523	348	175	451	288	163	57	47	10	15	13	2
1943	499	347	152	403	276	127	72	56	16	24	15	9
1944	633	460	173	475	326	149	117	102	15	41	32	9
1945	647	451	187	475	317	158	128	113	15	44	30	14
1946	688	412	276	513	308	205	104	75	29	71	29	42
1947	979	576	403	736	436	300	145	96	49	98	44	54
1948	1192	792	400	917	610	307	160	112	48	115	70	45
1949	1264	867	397	964	668	296	179	130	49	121	69	52
1950	1376	1015	361	1119	811	308	172	137	35	85	67	18
1951	1662	1226	436	1350	992	358	223	172	51	89	62	27
1952	1624	1260	364	1284	984	300	208	166	42	132	110	22

oil pools consisted of 984 new fields and 300 new pools in established fields. As yet, no single year has seen 1000 new oil fields opened, although several have been knocking at that door. The peak was 992 found in 1951, and they were eight greater than 1952's.

A substantial gain in distillate discoveries was made during the year. New fields and new pays, totaling 110 and 22 respectively, accounted for 132 new distillate discoveries. A year ago these finds had totaled 89, which were 62 new fields and 27 new pay strata.

Natural gas discoveries during 1952 were slightly fewer in number, but most closely approximated the previous year's record. The year's efforts uncovered 208 new gas pools, 166 new fields, and 42 new pays. A year before the score had been 223 new pools, 172 fields, and 51 pays.

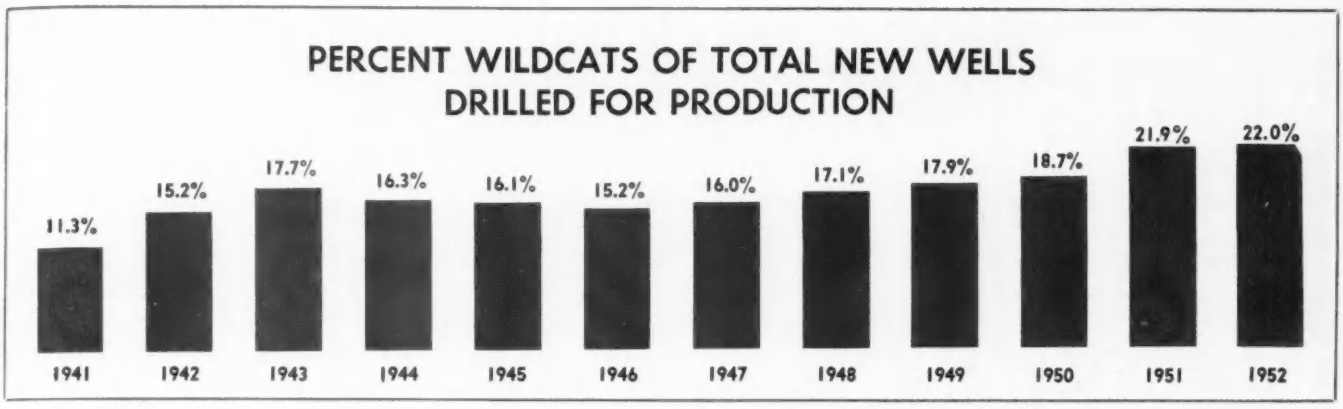
Taking all discoveries into consideration, the year just passed found 34 more new fields, but 72 fewer new pays in older fields than did the previous period. The year's 346 field extensions topped the 1951 total of 317 by 29.

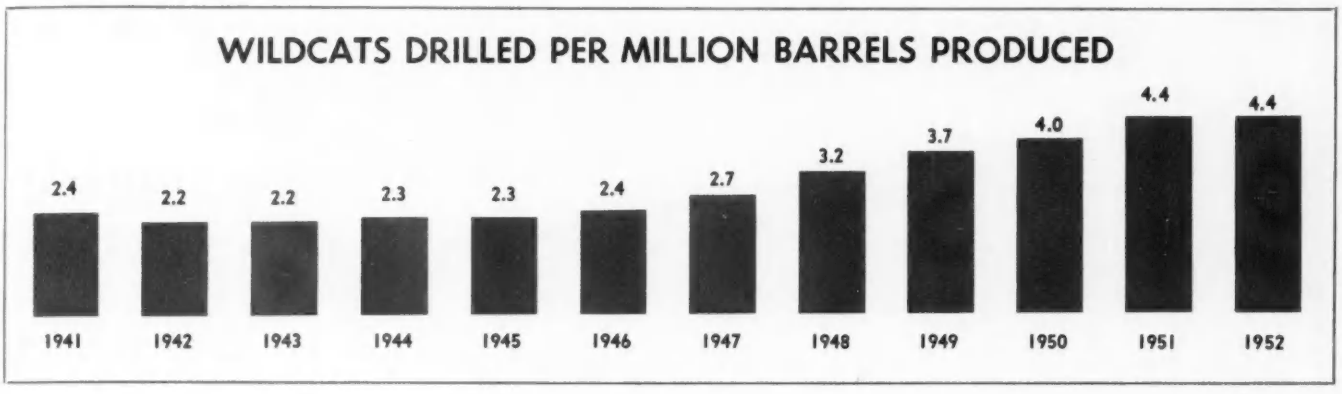
The three top exploration states upped their operations over 1951, while the next two in rank were the scenes of some decline. Texas, the No.

Ratio of Wildcatting to All Drilling and Proportion of Wildcats Discovering New Fields, by Districts, 1937-1952

STATE or DISTRICT	FIFTEEN YEARS, 1937-1951						YEAR 1952					
		*STRICT WILDCATS						*STRICT WILDCATS				
		TOTAL			PRODUCTIVE			TOTAL			PRODUCTIVE	
	Total New Wells Drilled for Oil or Gas	Number	Percent of All Wells	Dry	Number	Percent of All Strict Wildcats	Total New Wells Drilled for Oil and Gas	Number	Percent of All Wells	Dry	Number	Percent of All Strict Wildcats
Alabama	317	211	66.6	206	5	2.4	75	40	53.3	38	2	5.0
Arizona	45	45	100.0	45	.....	.....	2	2	100.0	2	.....	.....
Arkansas	3,971	957	24.1	878	79	8.3	432	127	29.4	112	15	11.8
California	25,277	3,425	13.5	3,245	180	5.3	2,459	423	17.2	384	39	9.2
Colorado	1,321	429	32.5	387	42	9.8	483	259	53.6	240	19	7.3
Florida	160	144	90.0	143	1	.7	9	9	100.0	9	.....	.....
Georgia	46	46	100.0	46	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	6	6	100.0	6	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	36,886	7,570	20.5	7,135	435	5.7	2,089	618	29.6	592	26	4.2
Indiana	9,407	2,720	28.9	2,471	249	9.2	1,346	380	28.2	349	31	8.2
Iowa	21	21	100.0	21	.....	.....	.....	.....	.....	.....	.....	.....
Kansas	35,459	6,148	17.3	5,185	963	15.7	4,182	1,029	24.6	889	140	13.6
Kentucky	14,081	1,515	10.8	1,366	149	9.8	1,423	162	11.4	135	27	16.7
Louisiana	22,751	3,095	13.6	2,662	433	14.0	2,395	452	18.9	386	66	14.6
North Louisiana	11,984	1,696	14.2	1,555	141	8.3	1,309	250	19.1	228	22	8.8
South Louisiana	10,767	1,399	13.0	1,107	292	20.9	1,086	202	18.6	158	44	21.8
Maryland	52	9	17.3	7	2	22.2	34	.....	.....	.....	.....	.....
Michigan	12,854	3,935	30.6	3,650	285	7.2	643	262	40.7	243	19	7.3
Mississippi	3,554	1,266	35.6	1,198	68	5.4	346	174	50.3	159	15	8.6
Missouri	868	221	25.5	217	4	1.8	30	17	56.7	17	.....	.....
Montana	3,696	364	9.8	318	46	12.6	324	94	29.0	85	9	9.6
Nebraska	650	367	56.5	342	25	6.8	247	134	54.3	120	14	10.4
Nevada	6	5	83.3	5	.....	.....	1	1	100.0	1	.....	.....
New Jersey	1	1	100.0	1	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico	7,916	948	12.0	807	141	14.9	1,086	155	14.3	118	37	23.9
New York	12,269	78	.6	76	2	2.6	1,077	.....	.....	.....	.....	.....
North Carolina	17	17	100.0	17	.....	.....	.....	.....	.....	.....	.....	.....
North Dakota	34	22	64.7	21	1	4.5	96	26	27.1	21	5	19.2
Ohio	16,882	411	2.4	361	50	12.2	983	32	3.3	31	1	3.1
Oklahoma	43,416	5,691	13.1	4,785	906	15.9	5,685	862	15.2	739	123	14.3
Oregon	12	12	100.0	12	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	29,579	101	.3	65	36	35.6	1,683	2	0.1	2	.....	.....
South Carolina	7	7	100.0	7	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	33	33	100.0	33	.....	.....	7	7	100.0	7	.....	.....
Tennessee	508	245	48.2	228	17	6.9	40	15	37.5	15	.....	.....
Texas	157,364	26,894	17.1	23,248	3,646	13.6	17,395	4,575	26.3	3,917	658	14.4
Dist. 1: S. Central	5,096	2,095	41.1	1,967	128	6.1	780	353	45.3	331	22	6.2
Dist. 2: Middle Gulf	[1]	[1]	.....	[1]	[1]	.....	816	333	40.8	281	52	15.6
Dist. 3: Upper Gulf	15,542	2,665	17.1	2,295	370	13.9	1,743	379	21.7	322	57	15.0
Dist. 4: L. Gulf-S.W.	29,309	6,232	21.3	5,401	831	13.3	1,611	466	28.9	384	82	17.6
Dist. 5: East Central	[2]	[2]	.....	[2]	[2]	.....	347	132	38.0	126	6	4.5
Dist. 6: Northeast	15,071	2,006	13.3	1,849	157	7.8	507	139	27.4	129	10	7.2
Dist. 7-B: N. Central	[3]	[3]	.....	[3]	[3]	.....	2,738	1,097	40.1	915	182	16.6
Dist. 7-C: W. Central	[4]	[4]	.....	[4]	[4]	.....	2,000	429	21.5	364	65	15.2
Dist. 8: West	38,059	3,694	9.7	3,096	598	16.2	3,125	455	14.6	391	64	14.1
Dist. 9: North	45,115	10,027	22.2	8,476	1,551	15.5	3,166	770	24.3	653	117	15.2
Dist. 10: Panhandle	9,172	175	1.9	164	11	6.3	562	22	3.9	21	1	4.5
Utah	178	109	61.2	100	9	8.3	77	53	68.8	51	2	3.8
Virginia	108	29	26.9	20	9	31.0	.....	.....	.....	.....	.....	.....
Washington	29	29	100.0	29	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	11,561	101	.9	67	34	33.7	582	4	0.7	3	1	25.0
Wyoming	4,103	713	17.4	595	118	16.5	654	170	26.0	159	11	6.5
Total U.S.	455,445	67,940	14.9	60,005	7,935	11.7	45,885	10,084	22.0	8,809	1,260	12.5
U.S. Total by Years, 1937-1951												
1937	32,474	2,182	6.7	1,943	239	11.0						
1938	27,764	2,443	8.8	2,179	264	10.8						
1939	26,654	2,746	10.3	2,488	258	9.4						
1940	29,161	2,982	10.2	2,672	310	10.4						
1941	30,149	3,409	11.3	3,047	362	10.6						
1942	19,729	3,001	15.2	2,652	349	11.6						
1943	18,641	3,298	17.7	2,951	347	10.5						
1944	23,733	3,885	16.4	3,425	460	11.8						
1945	24,482	3,946	16.1	3,486	459	11.9						
1946	28,145	4,242	15.1	3,830	412	9.7						
1947	31,084	4,983	16.0	4,407	576	11.6						
1948	37,448	6,410	17.1	5,618	792	12.4						
1949	37,812	6,781	17.9	5,914	867	12.8						
1950	42,173	7,891	18.7	6,876	1,015	12.9						
1951	45,996	9,778	21.3	8,552	1,226	12.5						

* Exclusive of all tests seeking new pay zones or outposts attempting to extend known fields.
[1] Dist. 2 included with Dist. 4.
[2] Dist. 5 included with Dist. 6.
[3] Dist. 7-B included with Dist. 9.
[4] Dist. 7-C included with Dist. 8.





1, raised its activity from 4889 to 5102 wells for a hike of 4.4 percent. Kansas was next in line in volume by drilling 1038 tests for a gain of 1.7 percent over the previous year's 1021. The only other state out of the top five to show an increase was Oklahoma, where exploratory drilling accounted for 948 completed wells against 853 for a gain of 11.1 percent.

The principal states where decreases occurred were Illinois, where tests dropped 18.5 percent to 697, and California where 524 wells amounted to a drop of 14.9 percent.

These leading drilling states had varying degrees of exploratory success during 1952. Texas, whose wells far outnumbered the others, also enjoyed better-than-average hunting percentagewise. The state's 989 successful ventures amounted to 19.4 percent of the total drilled. Kansas, with only 149 finds out of 1038 completed tests, could muster no better than 14.4 percent.

Oklahoma's efforts resulted in 209 successes amounting to 22 percent of the 948 drilled. Illinois contributed 105 successful exploratory ventures to the nation's total and they amounted to 15.1 percent of the 697 total. California did some better with its 90 producers, as they totaled 17.2 percent of 524 attempts.

Included in the exploratory drilling data are extensions and new pay tests drilled in productive areas, as well as rank wildcats. Considering the rank or strict wildcats alone, it is found that 1952's activity topped the previous all-time peak set in 1951 by a considerable margin. The year saw 10,084 wildcats completed for the first time to hit the 10,000 mark. That amounted to a gain of 306 tests or 3.1 percent over the 1951 record.

Of these wildcats, 1260 opened new oil, distillate or gas fields for a score of 12.5 percent. A year earlier, 1226 new field openers amounted to the same percent of the total number of wildcats drilled. In other words, in the last two years it has been necessary to drill eight wildcats on the average to discover a new field. That is to open just an average field, and of course it is much more difficult to find a large one. However, both 1951 and 1952 boasted slightly better wildcat records than has been the average since the end of World War II. Since 1946, the score of success has been 12.2 percent of all wildcats. The 1952 record of 12.5 percent also is favorably compared with the 11.7 percent that wildcatters have had to be satisfied with during the 15 years prior to 1952. One new field out of about 8½ wildcats drilled was the ratio during that period.

Even though the industry has been increasing its total drilling operations throughout the years, it has been devoting an increasing share to wildcatting. Back in 1937, when records separating wildcatting were first started, only about 6 or 7 percent of all drilling was exploratory. This ratio has steadily increased until wildcatting now accounts for more than one-fifth of all activity. In 1952, the peak of 22 percent was reached, while the previous high mark of 21.3 was set in 1951 when wildcat drilling reached 20 percent of the total for the first time in history. The prospect is for a continued increase in the proportionate part exploration will play in the industry's drilling campaigns of the future.

(See Table, Page 96)

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Results of Exploratory Drilling in the United States in 1952, by States, and Comparison with Earlier Years

(Based on Data Compiled by Staff of WORLD OIL)

Part 1: Productive Tests

STATE or DISTRICT	OIL: New Fields No.	OIL: New Fields Footage	OIL: New Fields Avge. Depth	OIL: New Pays No.	OIL: New Pays Footage	OIL: New Pays Avge. Depth	OIL: Extensions No.	OIL: Extensions Footage	OIL: Extensions Avge. Depth	DISTILLATE: New Fields No.	DISTILLATE: New Fields Footage	DISTILLATE: New Fields Avge. Depth	DISTILLATE: New Pays No.	DISTILLATE: New Pays Footage	DISTILLATE: New Pays Avge. Depth	DISTILLATE: Extensions No.	DISTILLATE: Extensions Footage	DISTILLATE: Extensions Avge. Depth	GAS: New Fields No.	GAS: New Fields Footage	GAS: New Fields Avge. Depth	GAS: New Pays No.	GAS: New Pays Footage	GAS: New Pays Avge. Depth	GAS: Extensions No.	GAS: Extensions Footage	GAS: Extensions Avge. Depth	TOTAL PRODUCTIVE No.	TOTAL PRODUCTIVE Footage	TOTAL PRODUCTIVE Avge. Depth
Alabama	1	5,984	5984	1	6,339	6339	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	565	565	..	.....	....	..	.....	....	3	12,888	4296
Arkansas	13	63,689	4899	5	16,739	3348	1	4,009	4009	..	.....	....	..	.....	....	..	.....	....	2	4,180	2090	2	9,043	4522	..	.....	....	23	97,660	4246
California	31	135,189	4361	22	128,492	5841	27	143,510	5315	1	9,970	9970	..	.....	....	..	.....	....	7	34,044	4863	..	.....	....	2	8,051	4026	90	459,256	5103
Colorado	11	58,745	5340	3	15,840	5280	2	10,415	5208	1	5,891	5891	..	.....	....	..	.....	....	7	36,000	5143	3	29,510	9837	1	5,694	5694	28	162,095	5789
Illinois	25	63,307	2532	25	72,126	2885	51	145,388	2851	..	.....	....	..	.....	....	..	.....	....	1	2,194	2194	3	6,195	2065	..	.....	....	105	289,210	2754
Indiana	29	49,938	1722	3	6,940	2313	19	39,722	2091	..	.....	....	..	.....	....	..	.....	....	2	2,000	1000	..	.....	....	..	.....	....	53	98,600	1860
Kansas	124	459,281	3704	8	27,919	3490	1	4,525	4525	1	7,350	7350	..	.....	....	..	.....	....	15	77,660	5177	..	.....	....	..	.....	....	149	576,735	3871
Kentucky	27	59,074	2188	2	4,168	2084	4	9,563	2391	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	33	72,805	2206
Louisiana	33	293,889	8906	16	137,158	8572	3	30,082	10027	27	315,183	11673	6	53,682	8947	3	36,548	12183	6	33,034	5506	2	15,988	7994	2	15,980	7990	98	931,544	9506
North Louisiana	13	84,216	6478	9	66,584	6732	2	18,355	8178	5	47,768	9554	3	21,771	7257	..	.....	....	4	18,578	4645	1	3,026	3026	1	5,830	5830	38	260,128	6845
South Louisiana	20	209,673	10484	7	76,574	10939	1	11,727	11727	22	267,415	12155	3	31,911	10637	3	36,548	12183	2	14,456	7228	1	12,962	12962	1	10,150	10150	60	671,416	11190
Michigan	17	48,006	2824	6	24,470	4078	7	15,182	2169	..	.....	....	..	.....	....	..	.....	....	2	5,862	2931	3	5,825	1942	1	1,443	1443	36	100,788	2800
Mississippi	13	101,645	7819	4	37,018	9255	3	22,725	7575	2	15,066	7533	..	.....	....	..	.....	....	..	.....	....	1	6,165	6165	..	.....	....	23	182,619	7940
Montana	7	50,120	7160	..	.....	....	2	9,364	4682	..	.....	....	..	.....	....	..	.....	....	2	4,589	2295	..	.....	....	..	.....	....	11	64,073	5257
Nebraska	11	57,439	5222	1	5,700	5700	2	9,451	4726	..	.....	....	..	.....	....	..	.....	....	3	15,415	5138	..	.....	....	2	10,143	5072	19	98,148	5166
New Mexico	19	155,680	8194	9	76,410	8490	7	57,358	8194	3	38,031	12677	1	7,615	7615	..	.....	....	15	85,868	5725	3	14,265	4755	..	.....	....	57	435,227	7636
North Dakota	5	54,340	10868	..	.....	....	5	51,106	10221	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	10	105,466	10545
Ohio	..	.....	....	..	.....	....	2	6,166	3083	..	.....	....	..	.....	....	..	.....	....	1	4,399	4399	..	.....	....	7	26,003	3715	10	36,568	3657
Oklahoma	99	487,218	4921	33	169,078	5124	43	187,512	4361	9	76,148	8461	2	14,238	7119	1	6,072	6072	15	58,278	3885	1	6,776	6776	6	30,941	5157	209	1,036,261	4958
Texas	510	2,553,852	5008	157	1,023,239	6517	104	623,929	5999	64	536,914	8389	13	118,105	9085	11	89,830	8166	84	528,399	6290	23	128,839	5602	23	143,319	6231	989	5,746,426	5810
Dist. 1: S. Central	15	48,724	3248	1	3,280	3280	8	32,569	4091	6	48,302	8050	..	.....	....	..	.....	....	1	1,181	1181	3	12,491	4164	1	10,455	10455	35	157,002	4486
Dist. 2: Middle Gulf	22	139,351	6334	8	53,348	6669	9	60,616	6785	18	143,405	7967	..	.....	....	4	36,639	9160	12	71,376	5948	1	4,060	4060	8	45,007	5626	82	553,802	6754
Dist. 3: Upper Gulf	30	258,212	8607	54	419,832	7775	10	78,083	7808	17	162,487	9558	9	87,051	9672	6	48,464	8077	10	81,105	8111	9	66,082	7342	9	65,787	7310	154	1,267,103	8228
Dist. 4: L. Gulf-SW	35	198,040	5658	21	150,257	7155	7	31,385	4484	14	114,184	8156	3	26,504	8835	1	4,727	4727	33	249,381	7557	7	36,782	5255	4	16,154	4039	125	827,414	6619
Dist. 4: East Cent.	4	19,394	4849	..	.....	....	1	5,995	5995	2	21,429	10715	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	7	46,818	6688
Dist. 6: Northeast	7	35,263	5038	7	52,627	7518	2	14,463	7232	2	13,310	6655	..	.....	....	..	.....	....	1	8,923	8923	..	.....	....	..	.....	....	19	124,586	6557
Dist. 7-B: N. Cent.	165	519,804	3150	12	41,174	3431	4	14,250	3563	2	9,568	4784	1	4,550	4550	..	.....	....	15	43,958	2931	2	5,207	2604	..	.....	....	201	638,511	3177
Dist. 7-C: W. Cent.	61	350,168	5740	9	51,493	5721	17	116,363	6845	1	6,585	6585	..	.....	....	..	.....	....	3	13,805	4602	1	4,217	4217	..	.....	....	92	542,631	5898
Dist. 8: West	60	473,969	7899	21	147,107	7005	32	219,155	6858	2	17,644	8822	..	.....	....	..	.....	....	2	14,543	7272	..	.....	....	1	5,916	5916	118	878,634	7446
Dist. 9: North	111	510,927	4603	24	104,121	4338	14	50,750	3625	..	.....	....	..	.....	....	..	.....	....	6	34,126	5688	..	.....	....	..	.....	....	155	699,924	4516
Dist. 10: Panhandle	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	10,001	10001	..	.....	....	..	.....	....	1	10,001	10001
Utah	2	15,773	7887	..	.....	....	2	15,376	7688	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	4,358	4358	..	.....	....	5	35,507	7101
West Virginia	1	2,810	2810	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	2,810	2810
Wyoming	6	35,046	5841	5	31,683	6337	2	11,220	5610	2	25,607	12804	..	.....	....	..	.....	....	3	16,990	5663	..	.....	....	..	.....	....	18	120,546	6697
U.S. Total, 1952	984	4,751,025	4828	300	1,783,319	5944	287	1,396,603	4866	110	1,030,160	9365	22	193,640	8802	15	132,450	8830	166	909,477	5479	42	226,964	5404	44	241,574	5490	1970	10,665,212	5414
U.S. Total Earlier Years																														
1937	203	831,123	4094	119	615,007	5168	3	9,036	3012	3	19,377	6459	3	24,574	8191	..	.....	....	33	77,389	2345	15	51,145	3410	..	.....	....	379	1,627,651	4295
1938	229	944,455	4124	144	815,186	5661	7	25,027	3575	4	23,657	5914	4	27,115	6779	..	.....	....	31	102,440	3350	11	49,634	4512	3	12,042	4014	433	1,999,556	4618
1939	224	782,289	3492	190	998,595	5256	..	.....	....	1	7,999	7999	3	24,709	8236	..	.....	....	33	103,450	3135	22	92,626	4210	..	.....	....	473	2,009,668	4249
1940	262	957,167	3667	167	914,442	5476	..	.....	....	2	12,792	6396	..	.....	....	..	.....	....	46	122,439	2662	16	55,983	3499	..	.....	....	493	2,062,823	4193
1941	301	1,165,966	3874	261	1,335,648	5117	..	.....	....	3	23,505	7835	2	7,109	3555	..	.....	....	58	177,974	3069	25	89,263	3571	..	.....	....	650	2,799,465	4307
1942	288	1,199,382	4165	163	879,116	5393	..	.....	....	13	121,620	9355	2	13,517	6759	..	.....	....	48	167,428	3562	10	50,712	5071	..	.....	....	524	2,431,775	4656
1943	276	1,232,396	4465	127	565,454	4452	132	559,090	4236	15	140,564	9371	9	88,031	9781	3	25,589	8530	56	212,814	3800	16	90,372	5648	10	58,996	8530	644	2,973,306	4617
1944	326	1,422,250	4363	149	731,764	4911	135	659,987	4889	32	250,228	7820	9	75,436	8382	10	79,797	7980	102	417,944	4097	15	95,099	6340	27	111,174	4118	805	3,843,679	4775
1945	317	1,503,763	4774	158	894,688	5663	154	702,822	4564	30	269,915	8997	14	140,464	10033	6	54,162	9027	113	486,529	4306	15	67,455	4497	70	216,103	3087	877	4,335,901	4944
1946	308	1,359,787	4415	205	1,227,305	5987	160	707,585	4422	29	264,441	9119	42	411,425	9796	7	63,111	9016	75	272,564	3634	29	166,588	5744	115	406,774	3537	970	4,879,580	5030
1947	436	1,999,100	4585	300	1,564,181	5214	169	693,950	4106	44	352,691	8016	54	505,112	9354	17	136,258	8015	96	403,038	4198	49	223,026	4552	77	254,076	3300	1242	6,131,432	4937
1948	610	2,760,127	4525	307	1,714,345	5584	170	758,977	4465	70	626,026	8943	45	432,625	9614	18	167,441	9302	112	514,990	4598	48	259,025	5396	41	162,801	3971	1421	7,396,357	5205
1949	668	3,027,759	4533	296	1,666,576	5630	273	1,233,190	4517	69	644,454	9340	52	459,017	8827	16	131,981	8249	130	626,058	4816	49	220,023	4490	36	141,146	3921	1589	8,150,204	5129
1950	811	3,607,484	4448	308	1,791,195	5816	290	1,388,816	4789	67	572,807	8549	18	164,699	9150	12	101,512	8459	137	679,851	4962	35	171,314	4895	49	221,808	4527	1727	7,699,486	5037
1951	992	4,767,425	4806	358	1,979,258	5529	242	1,226,022	5066	62	564,243	9101	27	231,253	8565	20	142,836	7142	172	937,257	5449	51	283,873	5566	55	253,494	4609	1979	10,385,661	5248

■ TABLE CONTINUED ON PAGE 98.

TABLE CONTINUED ON PAGE 98.

"Better records don't just happen"

SAYS PROFESSOR Doodlebug, S. S. C.

THEY RESULT FROM PROPER INSTRUMENTATION AND SELECTION OF THE RIGHT . . . . . .

- Size of the charges
- Depth of the shots
- Number of shot holes
- Positioning of geophone spread
- Number of geophones per trace
- Arrangement of geophones
- Degree of sharing energy between adjacent traces
- Overall instrument frequency response

EFFECTIVE FIELD TECHNIQUES ARE A MATTER OF . . . . . .

- *EXPERIENCE*
- *INSTRUMENTATION*
- *UNDERSTANDING OF THE SPECIFIC PROBLEM*

Our clients are assured that SSC's field crews possess these qualifications.

SSC

World-wide Experience

Seismograph Service Corporation

Seismic Surveys — Gravity Surveys — Pilot Crews — Lorac

TULSA 1, OKLAHOMA, U.S.A.

PART 2. Unproductive Tests and Total Exploratory Tests

STATE or DISTRICT	DRY WILDCATS			NEW DRY PAY TESTS			DRY OUTPOSTS			TOTAL DRY			TOTAL EXPLORATORY TESTS		
	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth
Alabama	38	229,434	6038	....	.....	....	....	.....	....	38	229,434	6038	41	242,322	5910
Arizona	2	10,755	5378	....	.....	....	....	.....	....	2	10,755	5378	2	10,755	5378
Arkansas	112	483,517	4317	....	.....	....	2	6,390	3195	114	489,907	4297	137	587,567	4289
California	384	1,695,871	4416	3	18,300	6100	47	230,936	4914	434	1,945,107	4482	524	2,404,363	4588
Colorado	240	1,269,188	5288	....	.....	....	2	9,907	4954	242	1,279,095	5286	270	1,441,190	5338
Florida	9	55,813	6201	....	.....	....	....	.....	....	9	55,813	6201	9	55,813	6201
Illinois	592	1,400,768	2366	....	.....	....	....	.....	....	592	1,400,768	2366	697	1,689,978	2425
Indiana	349	645,283	1849	....	.....	....	2	1,839	920	351	647,122	1844	404	745,722	1846
Kansas	889	3,379,738	3802	....	.....	....	....	.....	....	889	3,379,738	3802	1,038	3,956,473	3812
Kentucky	135	302,592	2241	....	.....	....	....	.....	....	135	302,592	2241	168	375,397	2235
Louisiana	386	2,952,065	7648	1	16,027	16027	5	31,218	6244	392	2,999,310	7651	490	3,930,854	8022
North Louisiana	228	1,264,883	5548	....	.....	....	4	22,653	5663	232	1,287,536	5550	270	1,547,664	5732
South Louisiana	158	1,687,182	10678	1	16,027	16027	1	8,565	8565	160	1,711,774	10699	220	2,383,190	10833
Michigan	243	553,478	2278	....	.....	....	....	.....	....	243	553,478	2278	279	654,266	2345
Mississippi	159	1,167,597	7343	....	.....	....	5	32,416	6483	164	1,200,013	7317	187	1,382,632	7394
Missouri	17	17,162	1010	....	.....	....	....	.....	....	17	17,162	1010	17	17,162	1010
Montana	85	398,996	4694	....	.....	....	2	5,112	2556	87	404,108	4645	98	468,181	4777
Nebraska	120	547,944	4566	1	8,864	8864	2	11,575	5788	123	568,383	4621	142	666,531	4694
New Mexico	118	654,836	5549	1	4,020	4020	1	3,893	3893	120	662,749	5523	177	1,097,976	6203
Nevada	1	11,543	11543	....	.....	....	....	.....	....	1	11,543	11543	1	11,543	11543
North Dakota	21	144,990	6904	....	.....	....	....	.....	....	21	144,990	6904	31	250,436	8079
Ohio	31	122,253	3944	....	.....	....	....	.....	....	31	122,253	3944	41	158,821	3874
Oklahoma	739	3,288,952	4451	....	.....	....	....	.....	....	739	3,288,952	4451	948	4,325,213	4562
Pennsylvania	2	15,988	7994	....	.....	....	....	.....	....	2	15,988	7994	2	15,988	7994
South Dakota	7	25,954	3708	....	.....	....	....	.....	....	7	25,954	3708	7	25,954	3708
Tennessee	15	18,600	1240	....	.....	....	....	.....	....	15	18,600	1240	15	18,600	1240
Texas	3,917	18,523,103	4729	6	52,362	8727	190	868,440	4571	4,113	19,443,905	4727	5,102	25,190,331	4937
Dist. 1: South Central	331	1,107,473	3346	....	.....	....	6	23,604	3934	337	1,131,077	3356	372	1,288,079	3463
Dist. 2: Middle Gulf	281	1,838,090	6541	1	7,512	7512	16	110,833	6927	298	1,956,435	6565	380	2,510,237	6606
Dist. 3: Upper Gulf	322	2,599,040	8072	....	.....	....	42	317,859	7568	364	2,916,899	8013	518	4,184,002	8077
Dist. 4: Lower Gulf-S. W.	384	1,982,381	5162	3	34,175	11392	13	66,139	5088	400	2,082,695	5207	525	2,910,109	5543
Dist. 5: East Central	126	490,764	3895	....	.....	....	3	24,391	8130	129	515,155	3993	136	561,973	4132
Dist. 6: Northeast	129	795,760	6169	....	.....	....	2	11,340	5670	131	807,100	6161	150	931,686	6211
Dist. 7-B: North Central	915	2,890,697	3159	....	.....	....	9	31,786	3532	924	2,922,483	3163	1,125	3,560,994	3165
Dist. 7-C: West Central	364	1,786,870	4909	....	.....	....	3	13,893	4631	367	1,800,763	4907	459	2,343,394	5105
Dist. 8: West	391	2,523,359	6454	1	8,170	8170	6	33,402	5567	398	2,564,931	6445	516	3,443,565	6674
Dist. 9: North	653	2,358,851	3612	1	2,505	2505	86	225,800	2626	740	2,587,156	3496	895	3,287,080	3673
Dist. 10: Panhandle	21	149,818	7134	....	.....	....	4	9,393	2348	25	159,211	6368	26	169,212	6508
Utah	51	310,543	6089	....	.....	....	....	.....	....	51	310,543	6089	56	346,050	6179
West Virginia	3	18,700	6233	....	.....	....	....	.....	....	3	18,700	6233	4	21,510	5378
Wyoming	159	726,485	4569	....	.....	....	2	13,858	6929	161	740,343	4598	179	860,889	4809
United States Total, 1952	8,824	38,972,148	4417	12	99,573	8298	260	1,215,584	4675	9,096	40,287,305	4429	11,066	50,952,517	4604
U.S. Total. Earlier Years															
1937	1,943	7,173,550	3692	....	.....	....	....	.....	....	1,943	7,173,550	3692	2,322	8,801,201	3790
1938	2,179	7,012,901	3218	....	.....	....	....	.....	....	2,179	7,012,901	3218	2,612	9,012,457	3450
1939	2,488	7,764,816	3121	....	.....	....	....	.....	....	2,488	7,764,816	3121	2,961	9,774,484	3301
1940	2,672	8,649,828	3237	....	.....	....	....	.....	....	2,672	8,649,828	3237	3,165	10,712,651	3386
1941	3,047	9,651,013	3167	....	.....	....	....	.....	....	3,047	9,651,013	3167	3,697	12,450,478	3368
1942	2,652	9,320,691	3515	....	.....	....	....	.....	....	2,652	9,320,691	3515	3,176	11,752,466	3702
1943	2,951	10,702,429	3627	....	.....	....	36	164,155	4560	2,987	10,866,584	3638	3,631	13,839,890	3812
1944	3,425	13,470,846	3933	22	141,039	6411	73	383,802	5258	3,520	13,995,687	3976	4,325	17,839,366	4125
1945	3,486	14,504,642	4161	39	284,441	7293	108	375,062	3473	3,633	15,164,145	4174	4,510	19,500,046	4324
1946	3,830	14,399,824	3760	38	274,592	7226	109	418,919	3843	3,977	15,093,335	3795	4,947	19,972,915	4037
1947	4,407	17,068,382	3873	59	330,897	5608	166	659,738	3974	4,632	18,059,017	3899	5,874	24,190,449	4118
1948	5,618	22,227,790	3957	23	127,597	5548	135	574,023	4252	5,776	22,929,410	3970	7,197	30,325,767	4214
1949	5,914	22,044,695	3728	46	183,003	3978	172	747,516	4346	6,132	22,975,214	3747	7,721	31,125,418	4031
1950	6,876	25,822,014	3764	41	153,029	3732	353	1,507,382	4270	7,270	27,542,425	3789	8,997	36,241,911	4028
1951	8,522	34,526,359	4037	40	217,136	5428	411	1,810,582	4405	9,003	36,554,077	4060	10,985	46,936,220	4273

ANOTHER General RESULT OF

DEEP THOUGHT ABOUT DEEP EXPLORATION

A NEW SEISMOMETER

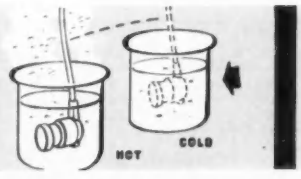
NEW PLUG-IN TYPE PIG TAIL

Designed to form a snug, trouble-free connection and eliminate time consuming field maintenance. Its sockets fit onto durable beryllium copper base-plugs made exclusively for General. This new feature is the only successful development of its kind now in use.

Another result . . . another reason why General's planned program of equipment improvement helps insure success in deeper exploration. General's new seismometer design was completed after several years of scientific research. Its hard chrome-plated steel case houses improved springs, coils, coil leads and numerous other exclusive features that combine to insure constant maximum performance. A new plug-in type connection is hermetically sealed in as a safeguard against moisture seepage. Before this modern instrument was put into service by General's experienced crews, it was subjected to extreme tests of durability and exacting performance under the most adverse field conditions. TODAY, GENERAL IS BETTER EQUIPPED TO SERVE YOU THAN DURING ANY OF ITS DECADE OF DEPENDABLE SERVICE.

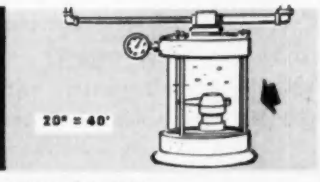
4 RIGID TESTS

SNAKE KILLER TEST:
Pig tail end is attached to mechanical whipping arm. Rapid jolts test durability of the unit and its connection.



HOT AND COLD WATER TEST:
To test moisture resistance, unit is submerged in boiling salt water then in iced salt water.

TUMBLER TEST:
Unit is in perfect condition after 20 hours of severe pounding against sides of iron case.



PRESSURE TEST:
In water filled pressure chamber, unit remains under 20 lb. pressure for 7-day period.

GULF BLDG. General GEOPHYSICAL COMPANY HOUSTON, TEXAS

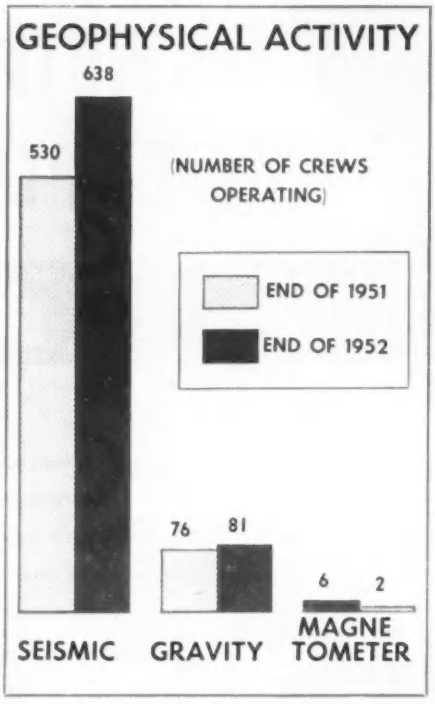
Geophysical Crews

Busy in Record Numbers

THE 741 GEOPHYSICAL and core drilling crews active throughout the nation at the close of last year exceeded the previous record year—1951—by 110. Comparative activity was decisively higher among geophysical crews, which numbered 721 in 1952 as compared to 612 the previous year. Twenty core drill crews were in operation at the end of 1952, one more than the 1951 total.

All divisions of geophysical activity shared in the increase except the magnetometer crews. Seismic operations again were credited with the greatest stride. At the end of 1951 there were 530 crews in action, or 86.6 percent of the total geophysical crews, which numbered 612. Last year, the percentage grew to 88.48 on the basis of 638 seismic crews operating afield.

An upsurge in gravimeter assignments last year resulted in field operation of 81 crews, five more than in the previous year. Thus, of geophysical operations underway at the end of the year, 11.23 percent of the activity was conducted by gravimeter.



A decline in 1952 of the use of magnetometer units was indicated by the fact that only two of these units were being used in the field while three times that number were operating in 1951, when .98 percent of all geophysical activity was being carried on by these units. In 1952, the percentage slipped to .27.

Texas and Louisiana were No. 1 and No. 2 states, respectively, in the amount of geophysical activity during the past year. Texas accounted for 233 crews as compared to 207 operating in 1951.

Louisiana, though ranking next to Texas in number of geophysical crews operating at the end of the year, experienced a decline from 112 in 1951 to 98 last year.

Geophysical and Core Drilling Activity at End of 1952 and 1951

(Figures represent number of crews. Data for 1951 as of December 31; for 1952, as of November 30. Source: Interstate Oil Compact Commission.)

STATE	GEOPHYSICAL								CORE DRILL CREWS		Total Geophysical and Core Drill	
	Seismic		Gravity		Magnetometer		Total Geophysical					
	1952	1951	1952	1951	1952	1951	1952	1951	1952	1951	1952	1951
Alabama	8	4	1	1	0	0	9	5	5	2	14	7
Arkansas	4	7	0	0	0	0	4	7	0	1	4	8
California	24	20	7	4	0	0	31	24	0	0	31	24
Colorado	14	26	1	3	0	0	15	29	0	0	15	29
Florida	14	2	0	0	0	0	14	2	2	1	16	3
Georgia	1	*	0	*	0	*	1	*	0	*	1	*
Idaho	0	0	0	0	0	1	0	1	0	0	0	1
Illinois	7	4	1	1	0	0	8	5	1	1	9	6
Indiana	0	0	0	0	0	0	0	0	0	0	0	0
Kansas	8	11	0	1	0	0	8	12	3	4	11	16
Louisiana	80	95	17	16	0	1	97	112	1	0	98	112
North Louisiana	12	14	0	2	0	1	12	17	1	0	13	17
South Louisiana	68	81	17	14	0	0	85	95	0	0	85	95
Michigan	2	0	6	0	0	0	8	0	3	3	11	3
Mississippi	19	11	5	2	0	0	24	13	0	1	24	14
Montana	58	35	12	2	0	0	70	37	0	0	70	37
Nebraska	11	13	0	0	0	0	11	13	0	0	11	13
Nevada	3	1	1	0	0	1	4	2	0	1	4	3
New Mexico	36	37	4	4	0	1	40	42	0	1	40	43
North Dakota	54	18	3	6	0	0	57	24	0	0	57	24
Oklahoma	30	30	1	1	0	0	31	31	1	0	32	31
South Dakota	*	6	*	1	*	0	*	7	*	0	*	7
Texas	207	175	20	28	2	1	229	204	4	3	233	207
East Texas	30	19	2	4	2	1	34	24	1	1	35	25
North Texas	20	*	2	*	0	*	22	*	1	*	23	*
Southeast Texas	51	50	2	6	0	0	53	56	1	0	54	56
Southwest Texas	38	33	3	9	0	0	41	42	0	2	41	44
West Central Texas	3	*	0	*	0	*	3	*	1	*	4	*
West Texas	65	73	11	9	0	0	76	82	0	0	76	82
Utah	9	8	1	0	0	1	10	9	0	1	10	10
Wyoming	49	27	1	6	0	0	50	33	0	0	50	33
TOTAL	638	530	81	76	2	6	721	612	20	19	741	631

* Not available.

Prospecting Outlook

Is for Accelerated Activity

Drilling to Pre-Permian Expected in West Texas

Pattern of development for 1953 in West Texas was designed by last year's activity.

The discoveries in the Midland-Upton Basin proper, particularly in Andrews County, left little doubt but what this year will see accelerated drilling to pre-Permian horizons in the trend.

This doesn't mean the eastern side of the basin, which has paid off handsomely in the past, or the Delaware Basin will be forgotten. Neither will the vast Spraberry Trend, which proved one of the disappointments of 1952 when evidence became available that the recovery per acre would be low in the area as a whole.

The Railroad Commission's action in approving 80-acre spacing with an 80-acre tolerance—meaning 160-acre spacing—will stimulate activity in the Spraberry. Not to the degree of early 1952, when approximately 250 rigs were active, but to a greater extent than the less than 50 rigs at the year's end.

While 1952 brought activity in the Delaware Basin, the exploration failed to develop anything of merit. There was a gas discovery from the Devonian in Culberson County at the M. A. Grisham et al M. A. Grisham 1, 30 miles northwest of Toyah at 9000 feet.

There also was renewed activity in Loving County, where there has been Delaware production since the 1920's.

However, the discoveries that cut the pattern for 1953 were chiefly from the Devonian and Ellenburger in Andrews County, one of the Permian Basin's older producing areas.

Importance of the deep discoveries in Andrews was reflected in the record high of $2,070,000 that the Phillips Petroleum Company paid for a 2560-acre drilling block in the eastern part of the county at a December auction of leases on University of Texas land. The block carries an obligation to drill an Ellenburger wildcat.

Deep Development. The emphasis on the deep development in Andrews began last February when the Gulf Oil Corporation opened the Triple N pool in the southern part of the county. The discovery was a 1015-barrel well in the 10,500 level.

There followed the Ellenburger discovery of the Phillips Petroleum Company in the Block 12 pool, after which the eastern part of the county began to pay off in the pre-Permian horizons.

First there was the Magutex Ellenburger pool of the Magnolia Petroleum Company, opened by its University 1-36994, which was good for 555 barrels at 13,840-884 feet. Then came the Block 6 Devonian discovery of the Texas Company, Midland Farms Ellenburger pool of Anderson-Prichard Oil Corporation et al, Block 5 Devonian pool of The Texas Company, and Northeast Andrews sector of Phillips.

Texaco's Block 6 discovery was its State 1, a 377 barrel well at 12,530-590 feet. The Midland Farms Ellenburger pool opener of Anderson-Prichard was the David Fasken 1-24 et al, which made 674.89 barrels on potential from 12,672 to 12,700 feet.

This well set off a drilling play on the Midland Farms land, which still was in progress at the year's end and is expected to continue during 1953.

Texaco brought the Block 5 pool into being at its State 1-AB, which made 123 barrels of oil from the Devonian in the 12,500-foot level. Group Oil Company furnished a Devonian discovery in Southern Andrews at its University 1, which yielded 299.2 barrels of oil daily from the Devonian between 8160 and 8228 feet.

The Northeast Andrews Devonian discovery of the Phillips was one of the better wells of the year in the basin, making 2310 barrels of 43.6 gravity oil on potential test through perforations in the 12,500-foot zone.

The majority of the Andrews pre-Permian discoveries are on University of Texas land and the anticipated resultant drilling play had not materialized at year's end.

However, there was every indication the play would come in 1953, and the open acreage still held by the University of Texas would bring spirited bidding at the auctions to be held during the year.

Drilling Spreads. Also caught in the 1952 pattern that outlined 1953's development were Gaines, Ector, Upton, Yoakum and Midland counties. In the southeastern part of the Permian Basin, Tom Green County was outstanding in 1952, setting off a drilling campaign that is expected to carry through this year.

Drilling also has spread across the state line into Lea County, New Mexico, as a result of a Devonian discovery in Yoakum County, which has possibilities of being a major strike.

The discovery was a unit operation with Amerada Petroleum Corporation as the operator and designated as the Hattie R. Weems 1, in the western part of the county, three miles south of Bronco, from which the pool got its name.

Sharing with Amerada in the discovery were Magnolia Petroleum Company, Sinclair Oil & Gas Company, Warren Petroleum Corporation and George Coates.

Although not fully cleaned up when the potential was taken, the discovery flowed at the rate of 1,934.50 barrels of oil and 517.66 barrels of drilling

mud daily at the 11,800-foot level. Gas oil ratio was only 187-1.

This discovery also flowed oil from the Mississippian at 11,000 feet, but dual completion was not attempted, but subsequent drilling is expected to be to both this horizon and the Devonian.

Travelling southeast in the Midland Basin from Yoakum there is a spreading drilling play in southern Gaines, resulting from a Devonian discovery of the Aurora Gasoline Company four miles northeast of the Jenkins San Andres and Devonian pool.

Designated the North Jenkins Devonian pool, the discovery was the Doss 1 M.S., a 209-barrel well at 9700 feet.

Humble Oil & Refining Company also found Canyon reef production in this area at its Riley 1, half a mile east of the Devonian discovery. The pool opener was good for 611.1 barrels of oil daily at 9000 feet, and will result in additional drilling.

Farther southeast Ector was caught in the swirl of 1952 activity that will bring accelerated drilling in 1953. In the northeastern part of the county, Herman Brown et al David Fasken 1, was completed as a dual discovery from the upper and lower Wolfcamp, being designated the MacBoring pool.

The upper Wolfcamp yielded 768 barrels at 8650 to 8775 feet and the lower Wolfcamp 230 barrels at 9660 feet.

However, the well that should put the impetus on the search for deep production still was being drilled at the year's end. It is the Texas Gulf Producing Company E. V. Headlee 1, four miles northeast of Odessa in Ector.

It has indicated prolific production on several tests of the Ellenburger below 13,000 feet after previously drilling through encouraging oil shows in the Wolfcamp, Pennsylvanian and Devonian.

Western Midland County, east of the Texas Gulf prospect, basked in the spotlight of pre-Permian drilling with a Strawn lime discovery at the Plymouth Oil Company Foster 1-A H. S., a 299.8-barrel well at 10,600 feet. Additional drilling already is under way in the area.

Strawn production also was found in western Midland at the Texaco's Scharbauer 3-A, which made a small well at 10,500 feet.

Western and southeastern Upton also received discoveries, as well as new pays for older areas. A Wolfcamp discovery for the western part of the county came at the Gulf Oil Corporation McElroy Ranch Company 1-L, 3½ miles southeast of the Wilshire Ellenburger pool, one of the outstanding discoveries of 1951 and which since has proved to be a major pool. The Gulf discovery, designated the Ranchel pool, was a small pumper at 9800 feet, but additional exploration already is underway.

The Wilshire Ellenburger pool picked up a new pay from the Pennsylvanian at Sinclair's McElroy 6, good for 65 barrels at 9875 feet.

In the southeastern part of the county, a Strawn discovery was completed at the Oscar Bourg Drilling Company and Clark Investment Company University 1, a well previously abandoned in the Ellenburger by Republic Natural Gas Company and Seaboard Oil Company. The new operators reworked the well in the Strawn, getting a 250.25-barrel producer at 8600 feet.

In all, 33 counties shared in West Texas discoveries in 1952, which proved a record year and supplied geological information for even greater development in 1953.

Busy Year is Foreseen For New Mexico Area

Continued drilling in the Delaware Basin, where deep wildcats still are in progress, and expanded exploration in Northern Lea and Eddy counties will make 1953 a busy year for New Mexico.

Three deep wildcats drilling in the Eddy portion of the Delaware Basin at the year's end which have had encouraging shows below the Delaware will go a long way toward determining to what extent activity in that area will expand.

The wildcats are being drilled on large units by Richardson & Bass. The tests are George H. Cobb-Federal 1, 23-20s-31e, four miles southwest of the Halfway pool; J .N. Fidel-Federal 1, 27-21s-29e, 14½ miles east of Carlsbad, and J. F. Harrison-Federal 1, 12-25s-30e, 25 miles south of the Cobb-Federal 1.

Eddy received a Delaware lime discovery, designated as the West Malaga pool, at Allen Hargrove's State-Humble 1, a small producer at 2300 feet. A Delaware sand pool opener was the Martin Yates III, Yates 1, 4½ miles northwest of the Black River pool, also a small pumper at 1800 feet.

While activity is resulting from these strikes and other Delaware tests are scheduled, much of the emphasis this year in New Mexico will be in northern Lea County, where deep pools continue to be opened.

The Northern part of the county saw such pools opened in 1952 as the Mescarlero, Moore, East Caprock, North Tulk, Tulk, North Saunders, Townsend, Echols, North Echols, King and Caudill, while new pays were added in the southeastern part of the county in the Teague, Fowler and Dollarhide pools.

Northern Lea also is receiving a play from a Devonian discovery in western Yoakum County, Texas, immediately east of the New Mexico line. This discovery was the Amerada Petroleum Corporation et al Weems 1, a 1934.50-barrel producer from the Devonian.

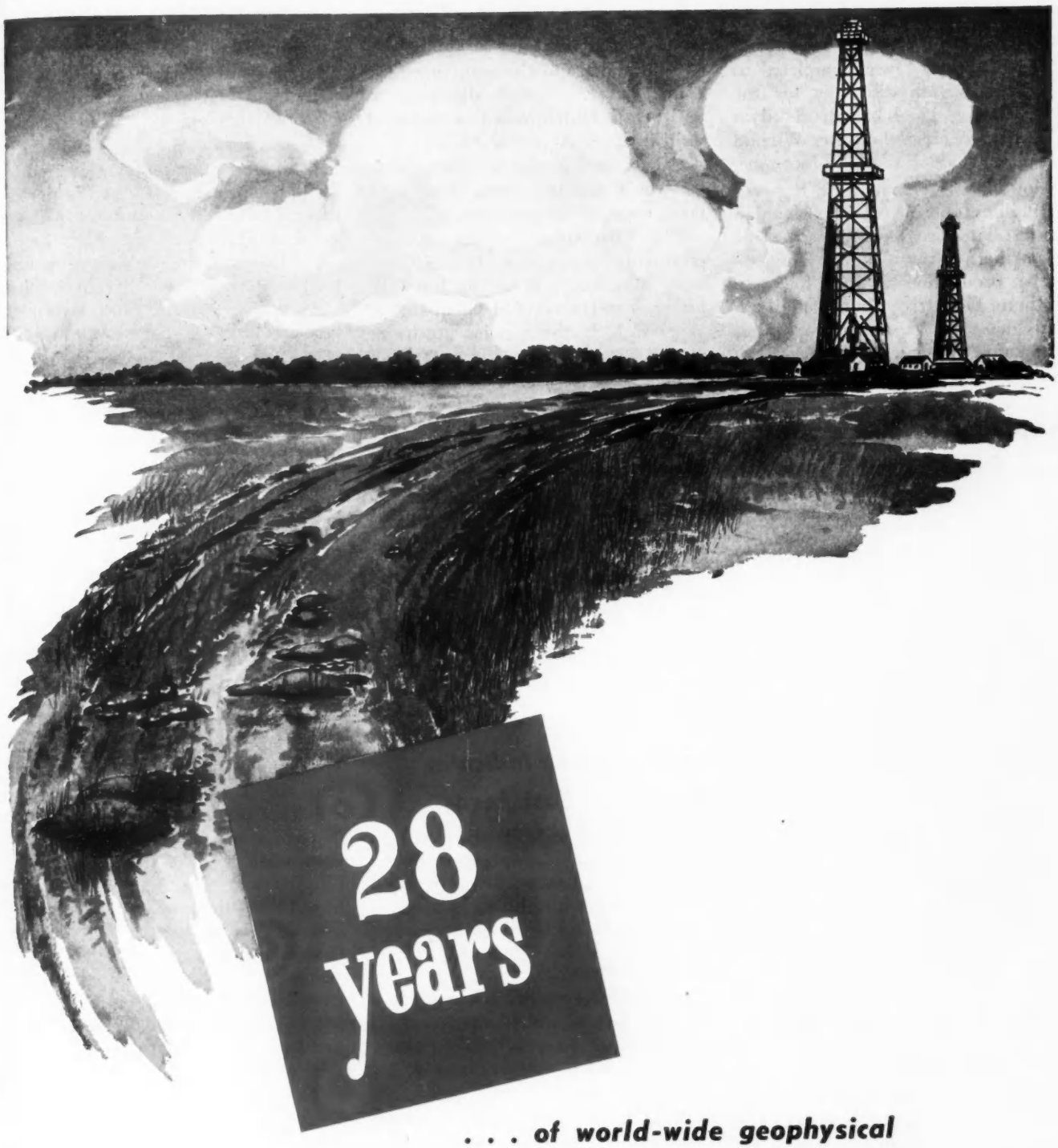
Revived Leasing Play Due in Panhandle Area

Discoveries from the lower Wichita Albany, more commonly known in the area as brown dolomite, and granite wash in southern Roberts County set off a play in the Panhandle last year which resulted in companies again leasing blocks which had been dropped following previous disappointments.

This revived leasing play is expected to continue through 1953, with expanding acivity in the Quinduno area, where the lower Wichita Albany and granite wash production was found.

Gulf Oil Corporation uncovered the Quinduno area, nine miles west of Miami in Southern Roberts.

It first found production from the lower Wichita Albany in the John Haggard 1, which led to the re-entering of an old core-test, completed as the John Haggard 2. The latter well made 442.28 barrels of 37.6 gravity oil daily to open the lower Wichita Albany production. There was a high gas oil ratio at the well, but subsequent drilling, in which Phillips Petroleum Company and Shamrock Oil & Gas Company have joined, has led to the lowering of the gas oil ratio in



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the new wells, which produce a crude rich in lubricants.

The Haggard 1 was completed as the granite wash discovery for the area, making 125.4 barrels of oil at 6700 feet, whereas the lower Wichita Albany pay was in the 4100-foot zone.

Not all of the play was in Roberts, as Phillips opened a Pennsylvanian gas-distillate discovery across the line in northern Gray County. Pennsylvanian production also was found in southern Ochiltree County and the East Shamrock gas area gave up oil production in northern Collingsworth County.

Deep Production Search Goes On in North Texas

Search for deep production in North Texas, one of the state's oldest oil producing areas, will continue to expand in 1953.

This was assured by 1952 development that saw the area enjoy one of its banner years, especially in Montague, Jack, Young, Archer and Wichita counties.

The leasing play that has extended south in the Fort Worth Basin from successes in the northern part of the section also will continue in 1953 and is expected to develop into deep drilling, possibly in Johnson, Hood, Hill and Bosque counties.

The quartet of counties has enjoyed the leasing play, with much of the acreage in each already put under lease.

Older Areas Are Revived In West Central Texas

Older producing areas of West Central Texas received discoveries in 1952, which should spur continued development this year.

One of these is Callahan County, where sand discoveries as well as new pools from other horizons created considerable interest.

Also climbing back into the limelight was Brown County, one of the area's oldest producing counties, as well as Stephens, Eastland, Coleman and Nolan counties.

Considered one of the better discoveries of the year for Callahan was the Box area eight miles east of Abilene, which set off a play which still is in progress. It made 247 barrels from the Palo Pinto at 3200 feet.

Continental Oil Company gave the county an Ellenburger discovery in its Ruth E. Hutchinson 1, a 96-barrel well in the 4400-foot level.

Out in front in number of discoveries was Coleman, where new sand pools were in the majority.

The Ellenburger, which gave up production in the early days of Coleman, also returned to the limelight in the Tex-Harvey Oil Company B. W. Welch 1, three miles northwest of Burkett. It made 133 barrels of oil at 3400 feet.

Nolan, also active in 1952, shows every indication of continuing a hot spot in 1953. The White Flats multipay area was one of the most interesting discoveries, with promise of more development due this year.

Fisher County, another older area in West Central Texas, received sand discoveries—two from the Canyon and one from the Strawn. However, the greatest activity was centered around the Claytonville pool, where drilling is expected to continue unabated in 1953.

Leasing Spree Indicates Activity in East Texas

Large scale leasing play in East Texas during 1952, swinging in an arc from Fannin, Lamar, Red River and Bowie counties into Ellis and McLennan counties in the southwest part of the district presages an active drilling campaign in 1953.

Several large blocks were acquired in Ellis, some of which stipulates that drilling must start in 1953. One of these will be a 9000-foot test in the Midlothan area.

Most encouraging in Bowie was the discovery of the Dalby Springs pool near Dalby Springs at the A. O. Phillips, John B. Stephens and American Liberty Oil Company T. A. Jackson 4, a 255.72-barrel well in the Paluxy at 4300 feet.

A discovery that set off a leasing play in the southeastern part of East Texas was in Angelina County, where the Kurth-Byars field was opened by B. G. Byars and E. L. Kurth Angelina County Lumber Company 1-A, six miles southeast of Lufkin. It was good for 84.03 barrels daily from the Wilcox sand at 4000 feet.

The Angelina-Caldwell flexure also was given new significance by a discovery in Houston County. It was the Woodley Petroleum Company W. T. Bruton Estate 1, good for 273 barrels daily from the Georgetown lime in the 9200-foot horizon.

A discovery at the year's end which had set off a drilling play, expected to continue through 1953, was in northeastern Cherokee County, only three miles southwest of the East Texas field. This was the Stone field, opened to production from the Woodbine sand by W. M. Kay and associates Noble Kee 1, a 64-barrel well at 3770 feet.

Hunt For Frio Reserves Pushed in South Texas

The search for new Frio sand oil reserves in South Texas, which proved successful in 1951, also paid dividends in 1952 with exploration stretching all the way to Rio Grande Valley counties.

Discovery of a multipay Frio sand reservoir in Hidalgo County, about five miles northeast of Sam Fordyce, proved to be the major oil development in South Texas during 1952.

The discovery was made on the West Ranch by the Houston Oil Company of Texas and American Republics Corporation. Gas and condensate was first uncovered in sand from 6048 to 6058 feet and this an oil sand was opened at 6204 to 6214 feet. These joint operators also opened another new oil sand at 6900 feet and George Coates, an independent operator, opened another pay in his Chapa 1 at 6272 to 6285 feet. Houston Oil and American Republics now are testing still another oil sand in their West 6.

The area, known as the Tobasco field, is considered heavily faulted but the multipay sands have started a new trend play up and down Rio Grande Valley.

Sharing the spotlight with Hidalgo County was another deep South Texas county—Zapata. Here a deep gas and condensate strike in the Wilcox formation by Standard Oil Company of Texas set off a widespread lease play which undoubtedly will be followed up in 1953 with an aggressive wildcat drilling program. Standard of Texas made the strike in its Ramirez et al 1 from 9115 to 9180 feet. This well is about five miles southeast of the Lopena field.

The Zapata activity is pointed

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toward deeper horizons and Standard of Texas now is drilling a wildcat several miles north of the Ramirez strike and this test—the Vela 1—is projected to at least 16,000 feet. Several deep shows of gas have been reported logged in this wildcat.

New Field. A new Jackson sand field is being developed by Humble Oil & Refining Company in Live Oak County, 3.3 miles southwest of Lagarto. This field, known as the Ramirena Southwest pool, produces from two pays at 4500 feet.

The Wilcox sand play on the eastern side of the South Texas region, centering in Lavaca, DeWitt, Victoria and Goliad Counties, and which saw considerable activity during 1951, tapered off during 1952 into a comparative steady development of known areas. However, new reserves were opened by Kirkwood and Company and Alex Head in the area just north of Hallettsville in Lavaca County. Wilcox zones yielded gas from 7750 to 7760 feet and oil from 8500 feet.

The bay areas, where drilling costs run considerably higher than on the mainland, were somewhat disappointing during 1952 and dry holes drilled in 1952 may temper the activity during 1953.

However, South Texas, where the drilling is shallow compared with other Texas areas, will continue to be one of the state's most active regions during 1952.

Gas reserves in this region were greatly expanded during 1952 and continued development of these reserves is expected during 1953.

Vast Wildcat Program Due Along Gulf Coast

A wildcat drilling program probably unequaled since the end of World War II is in prospect for the Texas Gulf Coast sector during 1953.

This forecast, predicated on an adequate supply of pipe, is the result of Texas oilmen once again emphasizing the importance of the prolific oil and gas yielding sands found in this region of the state.

Several independent oilmen, heretofore active only in West Texas, already are vieing with Coast operators in the search for new reserves on the sand trend.

Also, the prediction made several years ago by geologists that the old salt domes of the Texas Coast will yield much more oil, has been proved accurate. Almost every month during 1952 new sand lens were uncovered on the flanks of these old domes. New discoveries were made on the flanks of such domes as Big Hill in Jefferson County, Orange in Orange County, Esperson in Liberty County, Sour Lake in Hardin County and San Felipe in Austin County.

Early reports indicate that almost every known dome on the Texas Coast will receive special attention in exploration during 1953.

Gas reserves, because of the Interstate gas pipe lines that originate in the Texas Coast, continue to be of major importance. New reserves uncovered during 1952 will be greatly expanded during 1953.

New oil discoveries on the Texas

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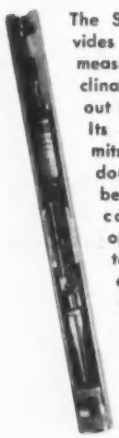

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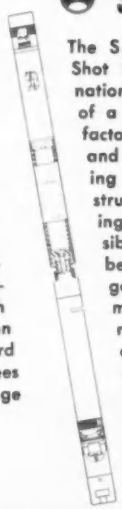

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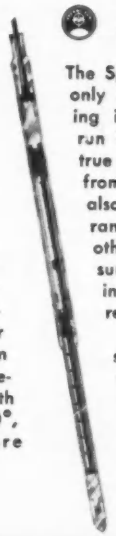

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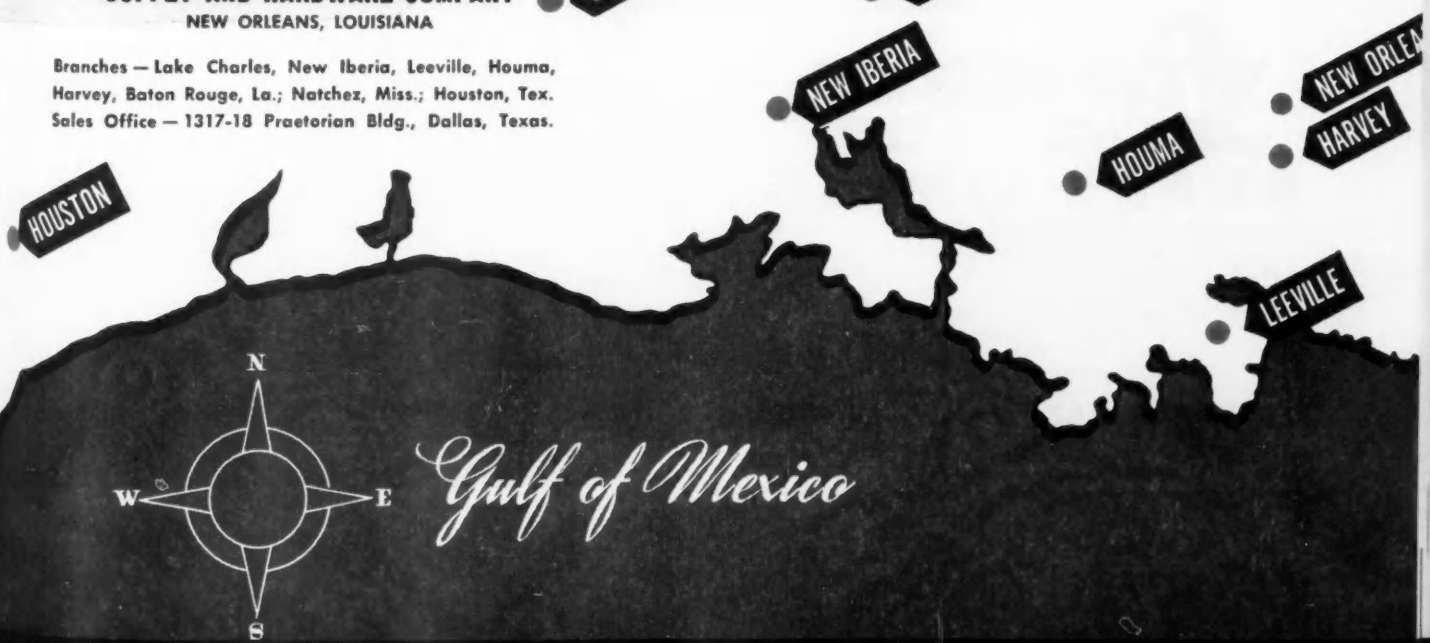


Coast were off to a slow start early in 1952 but persistent drilling through the summer and fall returned dividends and as a result the oil reserves of the area were substantially boosted through 1952.

One of the most prolific discoveries in 1952 was the South Hampton multipay field in Hardin County, four miles east of Kountze.

The field was opened by the Kirby Petroleum Company Wheat et al 1 which found Yegua oil sand at 7650 feet. This was followed by oil pay sands at 7120 and 8000 feet, and a gas sand at 8200 feet. Principal operators in the area are Houston Oil Company of Texas and American Republics Corporation.

The comparative shallow areas of Hardin, Polk, Newton and other Southeast Texas counties were the scene of numerous wildcat tests during 1952 and operators now indicate that wildcatting in this region of the Texas Gulf Coast will see increased activity in 1953.

Galveston Play. Galveston County received its most active wildcat drilling program last year than it has seen in many years. The drilling, aimed at deep sands around 10,000 feet, paid off in the opening of new oil fields at Alta Loma and south of the South Gillock field, an area known as the Galveston Big Sand pool.

Also, deeper oil and gas sands were uncovered in the Gillock area and prospects are bright for deeper production in the old League City field.

One of the most active counties in the Texas Gulf Coast during 1952 was Harris County. This was especially true of the north and east sections of the county where new pools were opened in what is called shallow sands for the Coastal region. Tennessee Production Company opened a 5000-foot sand pool at Huffsmith and the Fairbanks, Rankin and Durkee areas were given new sands.

Deep drilling has been the trend on the Texas Coast for many years but 1952 saw oilmen very successful in shallow tests and the shallow wildcatting may spread in all areas during 1953.

Louisiana Coastal Region To See Drilling Increase

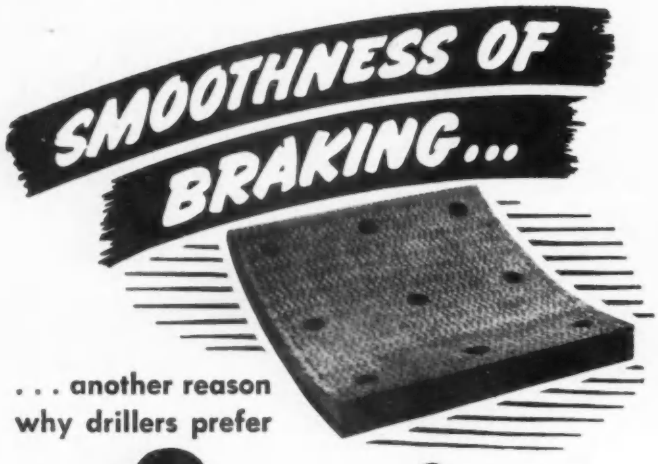
The coastal region of Louisiana will see a sharp boost in wildcat drilling during 1953 with activity on the north fringe of the area expected to be considerably above normal.

This forecast is based on the high rate of activity seen during December of 1952 and in January of this year. During the first two weeks of 1953 locations were staked for ten wildcat tests and discoveries of new pools and new pay sands numbered seven.

Although the deep trend of the coastal parishes will continue to see increased development, the activity during 1952 moved out along the comparative shallow sectors as Avoyelles, Rapides, Allen and Livingston parishes. However, reports indicate that several deep tests, projected to the Wilcox formation, are being readied for this region of South Louisiana.

Activity around the old salt domes will be increased during 1953 because of success made on many of the domes during 1952.

A major discovery of a new producing area was made by the Fifteen Oil Company of Houston on the east flank of the Charenton dome, St. Mary Parish, during 1952. In three wells, the company found as many oil



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sands. Other tests around this dome are slated during 1952.

Prolific production from deep formations was uncovered by John Mecom and Freeport Sulphur Company at Lake Washington, Plaquemines Parish, and development of this area is due in 1953.

The new Lobdell pool of West Baton Rouge Parish, opened in 1952, has turned into a multi-pay region. Humble Oil & Refining Company is the principal developer.

Gas reserves were increased tremendously in South Louisiana during 1952 and there is no indication that this trend will cease during 1953.

Superior Oil Company and Pan American Production Company were successful in opening new and deeper pay sands in the Cameron and South Pecan Lake pools of Cameron Parish.

Also slated for important exploration during 1953 are the Florida Parishes of Louisiana, from East Feleciana through Washington Parish.

Another development in 1953 could see renewed activity in the tidelands off the Louisiana coast. Operators are hopeful that some legislation will come about during the year that will enable them to develop new reserves in the coastal waters.

Steady Development Due In Northern Louisiana

Although North Louisiana was lacking in a major discovery during 1952, development and exploration is expected to continue at a steady rate during 1953. Leveling off of the supply and demand ratio on oil-country tubular goods, coupled with success factor realized by operators during the preceding year more or less assure activity equal to 1952 and 1951.

Search for the elusive but lucrative Wilcox production should continue in the central and east-central parishes during the year at a rate comparable with 1952. Of the 298 tests drilled in search of Wilcox production during 1952, including 111 wildcats, 91 were productive of oil and three of gas, making the program approximately 36 percent successful.

Cotton Valley formation is to figure importantly in the coming drilling program with a large part of the effort directed to developing new pays on flanks of productive structures. An eastward extension of production in this formation during 1951 proved disappointing, but large spreads taken under lease will be carefully worked with geophysics before they are dropped. Of course, if preliminary exploration indicates merit, prospects will be tested.

Apparent discovery of Smackover production on the old Monroe Gas field structure in Union Parish will create some drilling in the district during 1953. This represents a 33-mile southeast extension for production in this formation and will result in tests on structures lying between the Monroe field and other Smackover production to the west. Other exploration of the formation is also anticipated in different sectors of the large Monroe field which covers acreage in 18 townships and three parishes. Overall the field is productive from the shallow Gas Rock with a few scattered areas producing from deeper formations.

The incessant drilling program around and on the Pine Island uplift of Caddo Parish, northwestern Louisiana, will continue during 1953, although operators may become more cautious with deep exploratory efforts. Additional development will be attempted in the Rockpoint area of the parish where production is found in the Kilpatrick Zone of the Rodessa, also, Pettit lime development in the Mooringsport area will hold attention during the year.

Parishes of central-western North Louisiana suffered greatly for the lack of discoveries during 1952, although several wildcats were drilled, and exploratory drilling in 1953 may be hampered by this record. However, development is anticipated in existing fields, especially in DeSoto Parish.

Lucky field area of Bienville Parish, central North Louisiana, was active through 1952 and development will continue in 1953, possibly at a more accelerated pace. Other fields in this area will see development during the year with more tests in prospect for the West Bryceland field, which was discovered this year, along with Ada field where two key deep wells now are active.

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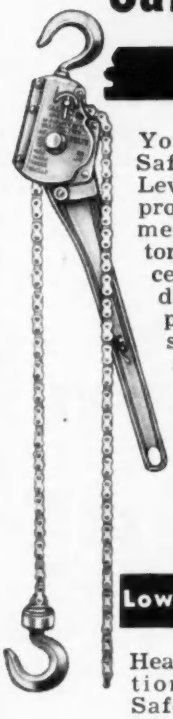

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Arkansas May Concentrate On Shallow Drilling in '53

With virtually all known anomalies of any extent tested for deep possibilities, activity in South Arkansas is expected to switch to shallower, chiefly faultline prospects, during 1953. While the southwestern counties — Lafayette and Miller—still retain untested deep prospects, wildcatting program in the south-central Provinces exhausted most of this type feature during the past year.

Some of these prospects undoubtedly will draw attention in coming years, but bitter disappointment met by all Smackover wildcats during 1952 will probably cool operators fervor toward deep exploration at the present time. Smackover possibilities probably will be given some attention in the up-dip counties of Bradley and Calhoun where the formation is found at considerably lesser depths than in counties immediately to the south.

While no particular discovery in the state appears to be of major importance, development of the several new fields and new pay intervals will require considerable effort this year. Five newly discovered areas saw several development tests expended during the past year and were still active at year's end.

Four important Smackover wildcats were active in the southwestern sector of Arkansas as 1953 came into being, three in the Midway Field area, Hempstead and Lafayette counties, and one in southeastern Miller County, lying a short distance north of the Louisiana line. At least one other Smackover test is thought to be scheduled for Miller County during the year.

New Pettit discovery in the Doddridge area of southeastern Miller County is due for development during 1953. Well is adjacent to Lafayette County and leasing program which extended into that province foretells possible exploration there.

Indicating more active exploration in western-central Arkansas, buyers leased approximately 555,000 acres in the McAlester Basin (Arkansas River Valley) during final weeks of 1951 and throughout the past year. Buying for six major accounts, landmen blanketed anticlines mapped in this area by the United States Geological Survey. Anticlines producing in this area are east-west trending structures which are productive of dry, sweet gas from sands of the Pennsylvania system. In light of continued success in development of existing fields and discovery of two new ones in this sector during 1952, drilling activity is expected to continue at a pace comparable with the past year. Drilling in this area is done largely with cable tools, although most operators use rotary to drill the lower part of holes scheduled for 3000 feet and deeper.

East-central Arkansas is due for more activity during future years than during the past. Show of gas in a rank wildcat in White County and an extended lease play by two major participants in this sector may well forecast more activity during coming years. Crowley's Ridge which runs on a north-south trend west of the larger part of the leasing activity during the past year has long held attention of independents in this area and is expected to do so until fully explored.

Prospects for Busy Year In Mississippi Brighten

With 1952 activity opening many new pools and new horizons in Mississippi, prospects are in the wind for a busy drilling year in 1953. Geophysical activity in parts of the state support this belief as well as widely scattered leasing programs.

Wilcox domination of the drilling program, which has prevailed for the past five years, is expected again in 1953, although interest is also awakening in other areas. Comparative drilling costs, production records and success ratios give good reasons for this view.

Fourteen of the 20 new fields opened in Mississippi during last year were from the Wilcox formation. Production in the formation was extended approximately 20 miles eastward into Forrest County. While development is hazardous due to erratic and lenticular sand conditions, this production is much desired and sought by independent and company alike.

"Hard rock" country (northeastern Mississippi) underwent a feverish lease play during 1952 with firms following leasemen closely with geophysical crews. Structures are being

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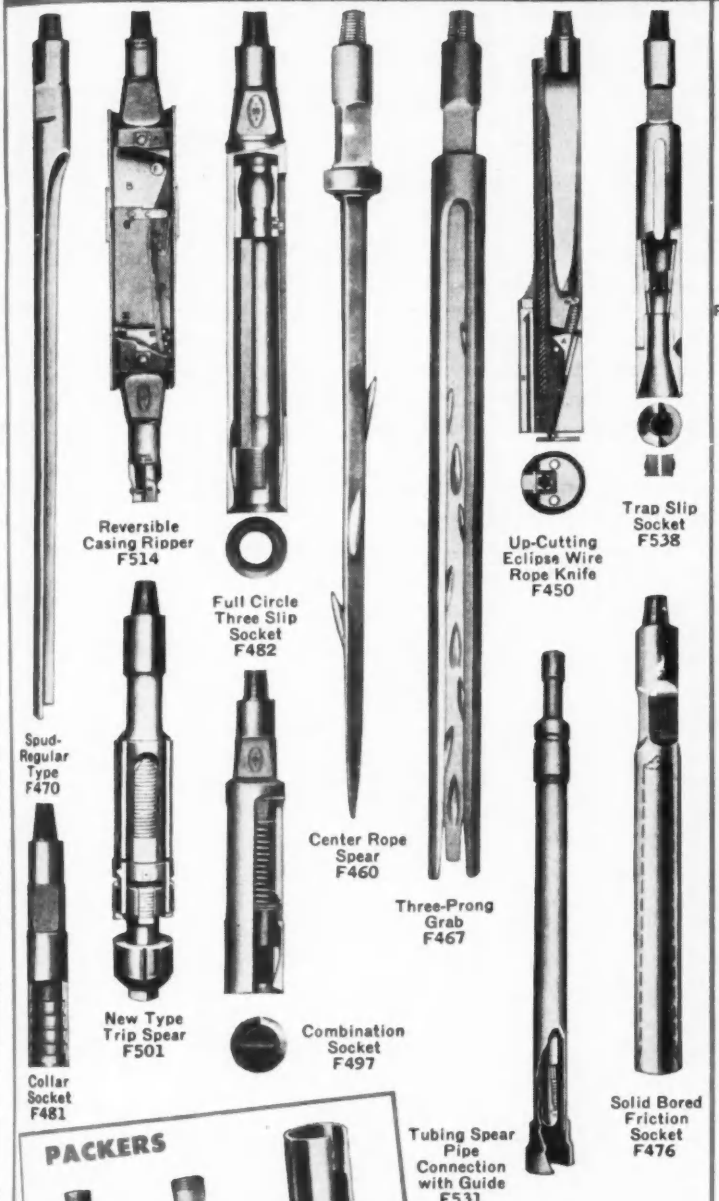
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re-shot and drilling activity is expected to increase during 1953, although a series of dry holes would greatly retard activity. Four wildcats were active in the area at year's end, with one having indicated possible commercial production and two others having tested shows of gas. Confirmation test was completed in Muldon field, Monroe County, and additional development wells are scheduled for the area. Due to lack of knowledge about structures in the sector, development will be of a cautious nature.

New fields, new pays and shows encountered in southern and southeastern Mississippi led to more active leasing during 1952 and will increase development and exploratory activity in 1953. New pays and shows in this sector ranged in depth from Wilcox (4450) to Lower Cretaceous (13,500). Deep show was encountered in a wildcat in Pearl River County which was still active in January. Large part of the leasing programs in this area were on flanks of the Wiggins Ridge, controversial and widely discussed anomaly found in northern Stone County.

Bitter disappointment of Smackover exploration, formation which has lured major operators in the state, served to wear some of the glitter from the prospects of commercial production from this formation. However, two wildcats were bound for this horizon at beginning of 1953, with others in prospect.

With commercial production established on flank of a piercement-type salt plug, one wildcat was started on this type feature late in 1952 and at least one other is anticipated this year. The Salt basin area of Mississippi is well supplied with this type structure as the 48th salt plug was proved by the drill during the past year.

Additional deep drilling in and on flanks of established fields will hold some major operators' attention during 1953. Deep oil production was opened in Baxterville field, Lamar County, during 1952 and may well lead to additional drilling in the area. Lower Cretaceous production also was established in Wayne County. Exploration of the Lower Cretaceous beds in areas already producing from basal Upper Cretaceous is also said to be considered during current year.

Discovery Due to Spur Illinois Basin Activity

A recent Salem limestone discovery along the Wabash River is expected to increase drilling in the coming year in the Tri-State area of Illinois-Indiana-Western Kentucky.

Almost all of the deep drilling is expected to be in Illinois and Indiana along the Wabash River. This is due to two recent discoveries of the Superior Oil Company's two Salem tests in White County, Illinois, about one mile northwest of New Harmony, Indiana, and the recent Salem test of the Deep Vein Coal Company in Gibson County, Indiana, about seven miles west of Princeton.

Operators are inclined to believe that this deep pay may run up and down the Wabash River, where there is already an indication of a structural high, as some nice pools are now producing from a shallow depth. It would be a distance of about 30 miles.

There was a decrease of approximately 500 in the number of wells completed in 1952 in Illinois, Indiana and Western Kentucky, compared with 1951. This decline probably was due to the fact that tubular goods were under PAD restriction and pipe could not be readily obtained for many inside locations. Last year 4343 wells were completed. That was 505 less than the 4848 completed in 1951. In 1950 there had been 5732 well completions. In 1949 the total was 4879.

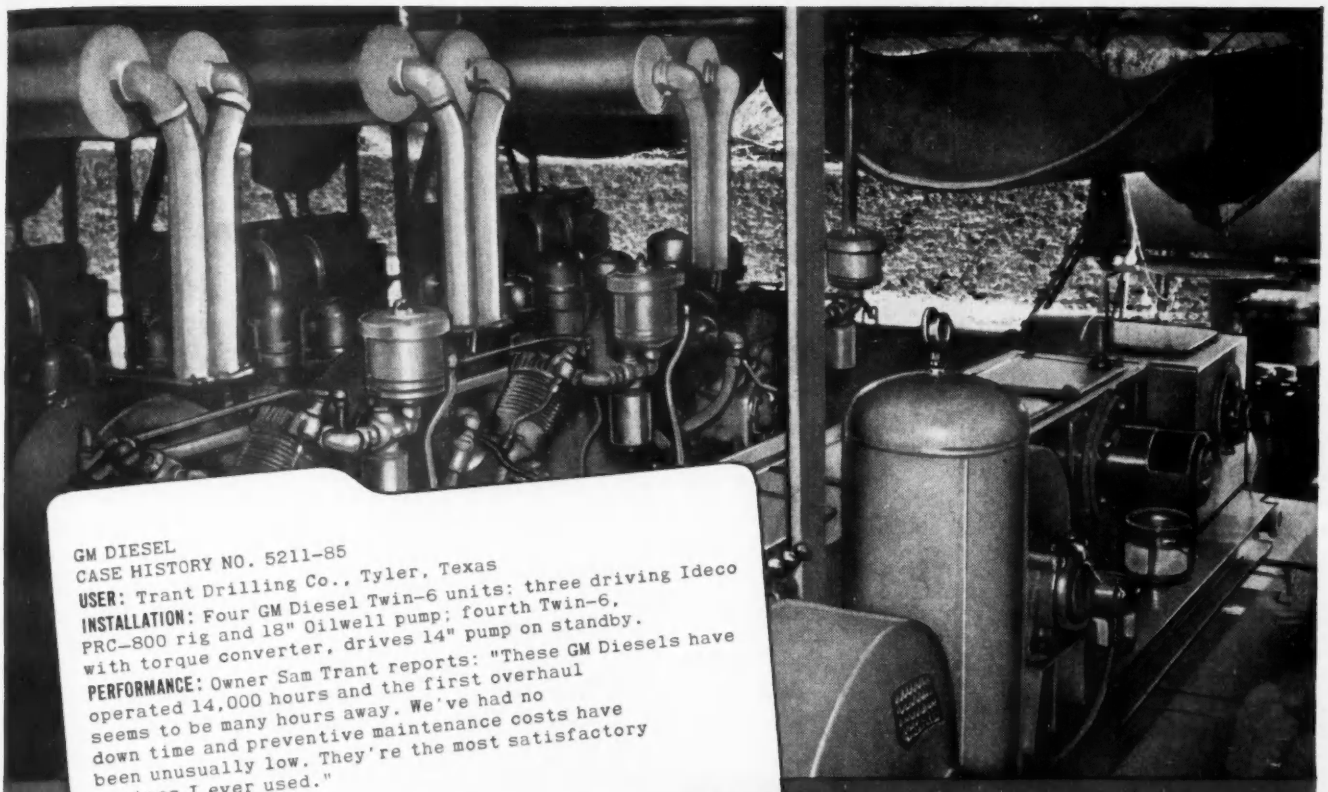
The following figures indicate the total number of wells drilled in each state of the area and the percentage that were producers and dry holes.

Producing Wells and Dry Holes Completed in 1952

STATE	Total Wells Drilled	Producers and Percent of Total	Dry Holes and Percent of Total
Illinois	2,089	826 (39.5%)	1,263 (60.5%)
Indiana	1,346	497 (36.9%)	849 (63.1%)
W. Kentucky	908	354 (39.0%)	554 (61.0%)
Total	4,343	1,677 (38.6%)	2,666 (61.4%)

In Illinois, on a cost basis of 15,000 barrels for a producer and 8000 barrels for a dry hole, the 826 productive wells completed must produce an average of 27,232 barrels to "pay for" the total 2089 drilling operations of 1952, excluding acreage costs, administration, overhead, lifting costs, etc., but including lease equipment and completion costs on producers.

More than 60 percent of the wells



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drilled were dry holes. This probably is due to the fact that a large number of wildcats were drilled in all three states, since PAD would grant pipe priorities for wildcat wells much quicker than for pool wells.

Illinois

Among the discoveries in 1952 in Illinois was the Zenith North pool, Wayne County, five miles north of Johnsonville, in 21-2n-6e. It was found by George & Wrather and Sam Lewis & Sons' Dwight McGrew 1, a dual-pay producer three miles from other wells. It made 251 barrels per day of oil from Rosiclare lime at 3083-3089 feet and McClosky at 3137-3140 feet.

The Ruark West pool, eight miles southwest of Lawrenceville, Lawrence County, Ill., was discovered by Coy Oil Company and Bury Drilling Company with their Wm. W. Prout 1, SE SE SW 12-2n-13w. It flowed 1200 barrels of oil per day from O'Hara lime at 2357-2363 feet and McClosky at 2385-2391 feet.

In Marion County, Ill., Eddie M. Self opened a new and deeper pay in the Raccoon Lake pool, Sections 2 and 3-1n-1e, two miles northeast of Centralia. His S. A. Dunbar 1, NW NW SW 2-1n-1e, flowed initially 1800 barrels of oil per day from Devonian lime at 2374-2380 feet.

Indiana

The new Glezen pool, Pike County, Ind., four miles southwest of Petersburg, centers around 16-1s-8w. It was discovered by Arthur Wilson and C. Bradshaw with their Ed. Dorsam 1, which produced initially 140 barrels oil per day from Benoist sand at 1363-1365 feet.

A new pool was opened in Gibson County, Ind., 5½ miles north of Princeton, in Survey 7-1s-10w, when Coy Oil Company completed David S. Huey 1 for 210 barrels oil per day from Aux Vases sandstone at 1852-1860 feet.

A promising discovery in 1952 in Indiana was the Riley South pool, seven miles southeast of Terre Haute, Vigo County. It was opened by Buford L. Fillingame and Kenneth M. Bayer with their Bresett Grocery Company 1, NW NW NW 34-11n-8w. Well produced initially 100 barrels of oil per day from Devonian lime at 1704-1711 feet. This pool now is producing over 800 barrels daily.

In the Princeton-Mt. Carmel area, Gibson County, Indiana, a new and deeper pay has been opened by T. & H. Corporation's Deep Vein Coal Company 1, SE SE NE 11-2s-12w, which was put on pump after swabbing oil at a rate of 400 barrels daily from Salem limestone at 2675-88 feet.

Western Kentucky

In Daviess County, Kentucky, a new pool was opened in the Raccoon Pond area, two miles northeast of Newman, in 19-Q-27, at a site more than two miles from other production. The discovery was made by M. W. Howard and W. E. Styles. Subsequently, some particularly good wells have been completed, one of the best having been J. C. Ellis's Own Fee (Hazel) 1, which flowed 606 barrels oil per day from the McClosky lime at 1772-1776.

A wildcat in Henderson County, Kentucky, opened a new pool one mile northwest of Spottsville, in 11-Q-25. The discovery well was Slagter Producing Company's F. Palmer Critser 1, which produced initially 170 barrels of oil per day from Benoist (Bethel) sand at 2000-2010 feet.

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U. S. Government Obligations	168,661,876.81	Acceptances		1,640,981.50
State, Municipal and Other Public Bonds	18,440,192.15	Dividend Payable January 2, 1953		112,000.00
Other Bonds and Securities	445,093.56	Reserve for Taxes and Accrued Interest and Expenses		2,221,992.84
Loans and Discounts	111,230,026.50	Other Liabilities		69,968.37
Bank Premises	2,961,045.05	Capital Stock	$ 2,800,000.00	
Other Real Estate	73,042.25	Surplus	15,200,000.00	
Customers' Liability Account of Acceptances	1,451,748.58	Undivided Profits	4,191,794.27	
Accrued Income and Other Assets	1,705,229.98			22,191,794.27
TOTAL	$408,935,443.07	TOTAL		$408,935,443.07

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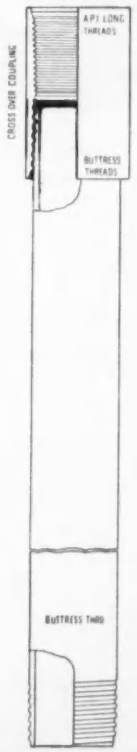

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Decline of Exploratory Drilling Due in Michigan

A further but not abrupt decline in exploratory drilling is indicated for Michigan in 1953. This conclusion is reached from the lack of any special interest by major companies and problems of independent operator development.

The Williston Basin play has not only drawn a number of former Michigan independent operators but it is commanding the attention of capital sources at one time liberally supporting Michigan wildcat ventures. The wildcat well rate the past three years has been down but should still top the the 200 mark.

This prediction could be upset quickly if production is established in either new horizons or on new structure trends. Big company interest centers on possibilities of the Niagaran lime, which on isolated tests has carried oil and gas.

Because of the economic factors, most independents are still concentrating on Traverse and Dundee production in areas, west Michigan in particular, at less than 3000 foot depths. For example, Clyde B. Miller's Hinsley School 1, SE NE, 25-9n-15w, Sullivan township, Muskegon county, rated 100 barrels per day, is producing from 1837 feet, and viewed as one of the best new play prospects of 1952. Six of the year's discoveries were in a like classification.

Two most interesting discoveries of 1952 were Dow-Brazos-Taggart's Unit 1, SE NE NE 27-19n-18w, Mason County, which produced up to 28 barrels of oil per day at 4224-4336 feet from the Niagaran; and Brazos Oil & Gas Company's State H-1, C NE NE, 15-29n-2w, Otsego County, producing 15 barrels from Salina at 6638 feet. Salina and Niagaran are of Silurian age and of course deeper than Devonian which has been the state's major producer from the Traverse, Dundee and Monroe dolomites and limes.

Ohio

The search for new production, somewhat increased last year, is expected to be continued. The principal incentive is the prospect of finding additional oil pools in the vicinity of the Mt. Zion and New Castle fields.

Two pools in the area, and possibly a third, were found in 1952, and are being developed. The search for new Pennsylvania grade oil pools is at a standstill and probably will remain so as long as the present price ceiling is held.

Several small gassers were found indicating possible new pools, but none were of sufficient volume to justify development. Northwestern Ohio should get several tests this year, and at least one deep test should be drilled in the southeast part of the state.

Exploration and Drilling At New Highs in Montana

Last year was the greatest in Montana history for oil developments, particularly in the Williston Basin. There will be more exploration in the state in 1953 than ever before, and both wildcatting and development drilling will increase in the Williston portion in the northeast and in the northern portion of the Powder River Basin in the southeast. Montana's increasing importance is shown by the large acreages under lease, particularly

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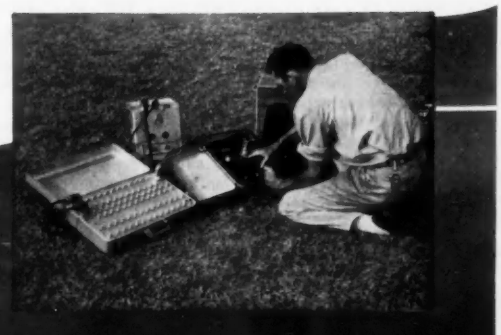

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in the Williston Basin, by both independents and majors, and by the establishment last year of state officers.

There were further significant oil discoveries in 1952 along the western part of the Williston Basin. Southwest of its 1951 discovery at Richey in Dawson County, Shell Oil Company completed 21-33-D-NPRR in McCone County for flow from the Devonian and Silurian at 9000 feet. The Texas Company made discoveries in three areas near Glendive in following up its Cedar Creek discovery of 1951. One, 1 NPG NCT 4, was in the Madison at 8000 feet. On the southeast end of the Cedar Creek anticline less than a mile west of North Dakota, Shell discovered Ordovician production at 8500 feet.

The East Poplar area of Roosevelt County figured heavily in 1952 Williston Basin development drilling by C. H. Murphey of El Dorado, Ark., and others. Murphey's No. 10 unit, a three-mile northwest stepout from the field, was a Madison discovery at 6800 feet.

The possibilities of Tensleep production in the northern part of the Powder River Basin were pointed up by a discovery over 100 miles north of where the formation produces in Wyoming. Tensleep production was found by George J. Greer of Dallas, at 4500 feet in the Snyder Field.

North Dakota

There was more wildcat drilling in North Dakota in 1952 than in 1951, but discoveries did not come up to the Amerada Petroleum Corporation's Beaver Lodge discovery of the latter year. The outlook for 1953 is good and there will be a lot of drilling. Wildcatting along the east of the Williston Basin made no discoveries last year.

Discoveries were by Amerada on the Nesson anticline in northwestern North Dakota. North of Beaver Lodge in Williams County, Harry Bakken 1 was completed for Madison production below 8300 feet after also testing oil in the Devonian and Silurian. Three pools were established south of Beaver Lodge. Drilling for one of them, Binhommer-Risser 1, a Madison completion, set a depth record of 13,773 feet. Amerada had a Madison discovery in the Charlson area.

South Dakota

Geophysical work and drilling will continue in South Dakota in 1953 despite a lack of success in 1952. There is yet no commercial oil production in the state. Three Shell Oil Company wildcats in the southern part of the Williston Basin were failures. However, a Carter Oil Company wildcat program is scheduled.

Deep Drilling Program Continues in Wyoming

A number of wells were drilled in Wyoming again in 1952, but there were no particularly outstanding developments. There has been emphasis on deep drilling in basins and it will continue in 1953, as will geophysical operations aimed at wildcatting. Perhaps of greatest interest this year are the possibilities of extending production northward in the Powder River Basin and development of Mesa Verde formation production in the Green River Basin of the Southwest.

Powder River production was extended some miles north from the Johnson County fields with the Shan-

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non sand discovery between 4700 and 4750 feet of J. Ray McDermott of New Orleans, at Ash Creek in Sheridan County not far south of the Montana boundary.

The Mountain Fuel Supply Company's Trail 2 in Sweetwater County found gas in the Mesa Verde at 7500 feet. The Stanolind Oil and Gas Company found oil in the Mesa Verde at 8000 feet in the Middle Mountain discovery.

As predicted, more Tensleep production was found in the Powder River Basin. The Navy found Tensleep production at 5300-400 feet on the Teapot Naval Reserve. The Continental Oil Company made another Tensleep discovery at 8700 feet in the Sussex field of Johnson County.

Phosphoria discoveries were of interest in northwestern Wyoming's Big Horn Basin. The Husky Oil and Wilshire Oil Companies' Torgeson 1 at Five Mile in Big Horn County had an estimated 50 million cubic feet of natural gas and 500 barrels of distillate a day from the Phosphoria at 11,600-700 feet. To the south, the Gulf Oil Company's 11,300-foot Stockham Federal 1 in Washakie County produced gas and distillate from the formation.

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Idaho

Two deep tests in eastern Idaho were plugged by the Standard Oil Company of California in 1952. The failures doubtless will discourage future drilling. The Phillips Petroleum deep wildcat on Horseshoe Creek in Teton County had no commercial shows to below 11,700 feet.

Brisk Wildcat Activity To Continue in Colorado

More wildcats were drilled in Colorado in 1952 than in any other Rocky Mountain state. Most of the wildcatting was in the Denver-Julesburg Basin in the northeastern part of the state, but there were discoveries in other parts of the state as well, notably in Jackson County of the north-central portion.

Wildcat drilling in the Denver-Julesburg, much aimed at the Dakota sands, will continue high in 1953. And the M. E. Davis' find in Jackson County will lead to additional drilling in northern Colorado and through the park areas of the central mountains. Heavy leasing already has resulted in the so-called South Park, mountain girt basin west and slightly south of Denver.

Successes last year in Washington County extended Denver-Julesburg production southeastward into areas where drilling previously failed. In Washington County, the Jounes 1 of R. L. and J. L. Rush of Texas found D sand oil at 3900 feet and Southern Production's Mott 1 found J sand gas at 4800 feet.

Most Denver-Julesburg discoveries were in Logan and Weld counties. The Luft 1 of the Plains Exploration Company of Denver hit D sand oil production at 4800 feet in Logan. The

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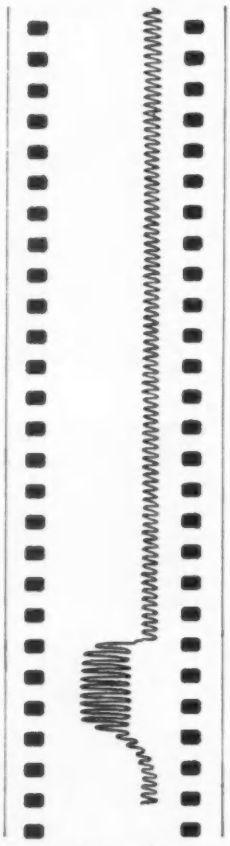

Specimen of tape indicating saturation

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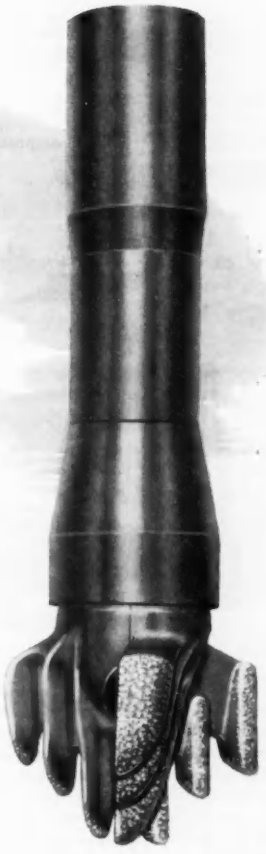

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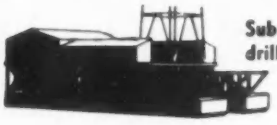

Submersible drilling barges

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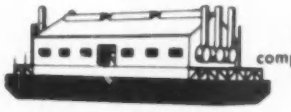

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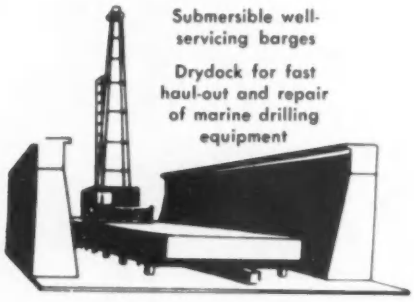

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Johnson 1 of Tueley and Carter of Denver was a J sand gas and distillate find at 5800 feet in Weld. Shell Oil Company had both D and J sand discoveries in the Dale Pool, west of Sterling in Logan County.

The State 1 of M. E. Davis and others on the Coalmont anticline in Jackson County flowed oil from the Frontier, topped at 6884 feet, setting off lease play and geophysical work in North Park.

Western Nebraska

Denver-Julesburg Basin drilling increased in Nebraska in 1952, resulting in new finds, mainly in Cheyenne and Kimball Counties, and extending production north and east. As the result of new areas of production being found, there will be additional wildcatting in 1953.

The Hart 1 of G. H. Chichum of Dallas, Texas, found J sand oil at 4000 and extended production north in Morrill County.

The Ohio Oil Company again was the prime mover in the Nebraska portion of the Denver-Julesburg and made a number of the discoveries, among them one, Kugler 1, a Dakota discovery at 4500 feet, extending production eastward in Cheyenne County.

Accent on Exploration In Uintah Basin Area

Drilling increased in Utah in 1952, and the Uintah Basin had its best year. The trend in the Uintah Basin this year probably will emphasize increased exploration as well as the best production methods for the Green River formation producing zones. Wildcatting will be increased on the Wasatch Plateau as result of the Clear Creek, Carbon County, gas discovery of the Three States Natural Gas Company in 1952.

Northeast of Red Wash in the Uintah Basin The Carter Oil Company made an oil discovery at 5500 feet. Carter also had an oil discovery in the southern portion of the basin in the Flat Mesa area.

Northwestern New Mexico To Concentrate on Gas

Close to 300 gas wells were completed but there was only one small oil discovery in the Blanco, La Plata and West Kutz fields of northwestern New Mexico in 1952. Development drilling will continue to dominate in 1953 to get the gas needed for West Coast outlets, although there may be some deep exploratory drilling on the east side of the San Juan Basin.

One of the new gas wells, good for a half million cubic feet daily, was completed by Blackwood and Nichols in the Dakota at 7800 feet on the Blanco Unit.

Stanolind's 13USG in the Hogback Field of San Juan County found oil as well as gas at 6900 feet in the Mississippian.

Fewer, Deeper Wildcats Forecast in California

Drilling in California during 1953 probably will stay very close to the rate established in 1952.

As for wildcatting, plans of individual companies vary considerably but overall it would appear as if the number of wells scheduled might decline as much as 5 per cent. However, wildcat footage is likely to remain unchanged or possibly increase slightly. The trend in California for 1953 seems to be toward less wildcats but deeper.

Development drilling probably can

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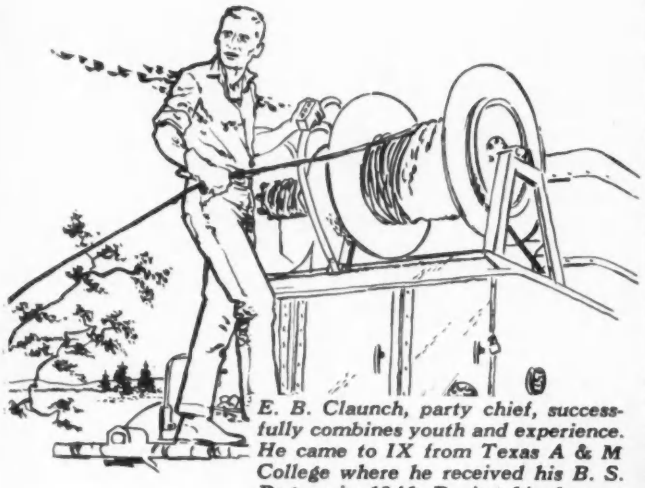

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be maintained at the 1952 rate although several of the companies reported they would have to find more pools than they have the last few years if they are to continue the pace.

The average production of California wells has been declining for the last several years and as a result operators are being forced to drill more marginal wells. The price increase which is expected in California in the near future may for a time stimulate drilling particularly in the marginal pools.

During 1952 there were only 7 new fields discovered and 19 new pools and extensions. Three appear to be of major importance.

Possibly the outstanding discovery of the year was that of the Union Oil Company at Torrey Canyon and Oakridge in Ventura County. While there appears to be two separate fields found here they are only two miles apart and the gap is closing rapidly. There are indications the two may overlap before the year is out. However, there is every reason to believe that a large reserve has been discovered. There is little doubt also that the find will stimulate wildcatting all along the Santa Clara Valley from Castaic to Ventura. As it stands today it would appear as if this valley will receive much of the exploratory attention during 1953.

Second Find. A second find of real importance during 1952 was the Richfield Oil Corporation's Eocene sand discovery under the old Wheeler Ridge field in the southern part of the San Joaquin Valley. This discovery opened the first Eocene production in the Bakersfield area. The opening of the sand will lead to a number of deep tests in the Southern San Joaquin Valley as the Eocene has been looked at in very few wells in the district.

In Santa Barbara County a new field discovery was made by Union Oil Company. It has been named the Jesus Maria field. Only one well has been completed and that is yielding nine gravity oil. The indications are, however, that the accumulation is a large one, but the market situation on this low gravity oil probably will determine the extent of development drilling and further wildcatting of the area.

Another discovery in California, while a small one in daily production, could be an important test in the overall picture. This is Union Oil Company's Horse Meadows field in the Castaic area of Los Angeles County.

This well was completed from what is thought to be cretaceous rocks. If true, it is the first well in the southern part of the state and one of the few in California to yield oil from cretaceous sands. Further successful drilling in this field would be most significant and would throw open to deeper exploration many areas of the state.

The Horse Meadows field is again in the Santa Clara Valley, the same as Torrey Canyon and Oakridge and therefore adds to the exploratory possibilities of the area.

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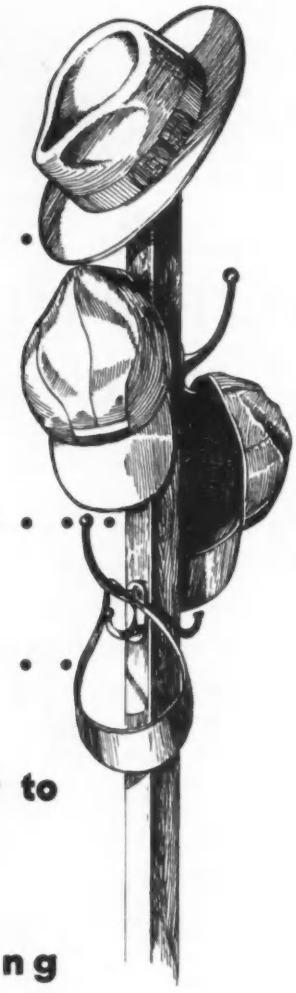

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Drilling Forecast

Is for 46,988 New Wells

By **WARREN L. BAKER and CECIL W. SMITH,** WORLD OIL Staff

COMPLETION OF AN all-time high of 46,988 new wells during 1953 in the United States is forecast by WORLD OIL. This calls for the drilling of 1103 wells or 2.4 percent more than the 45,885 wells drilled in 1952.

In completing these wells, it is estimated a record 190,741,971 feet of hole will be drilled in 1953, a gain of 4,342,077 feet or 2.3 percent over the 186,399,894 feet drilled during 1952.

Only a sharp decrease foreseen for West Texas drilling keeps the outlook for completions from being much higher than forecast. Practically all states or regions outside of West Texas are expected to either drill more wells or to closely approximate their 1952 drilling volume. Due primarily to lessened activity in the Spraberry trend, only 3960 wells are forecast for West Texas during 1953 compared with 5125 in 1952. This loss of 1165 West Texas wells is more than offset by anticipated activity elsewhere.

Wildcat drilling again is expected to be very prominent in the U. S. drilling picture. The forecast compiled by WORLD OIL is for the completion of an estimated 10,542 wildcats in 1953, which is 22.4 percent of total completions and in contrast with 10,084 wildcats drilled in 1952.

Neither the forecast for footage nor wells includes any allowance for old wells which are drilled deeper, but does cover all so-called "new wells," including salt water disposal and water or gas-input wells in addition to tests drilled in search of oil and gas.

Prospects are that drilling activity in the first half of the year will lag behind rates during the corresponding period of 1952. The first half of 1952 saw the completion of an unusually large number of wells, and it is unlikely that 1953 operations will reach the same high level. Activity in the last six months of 1952 was depressed by the steel strike, and it seems probable that operations in the last half of 1953 will exceed those of a year ago by substantial margins.

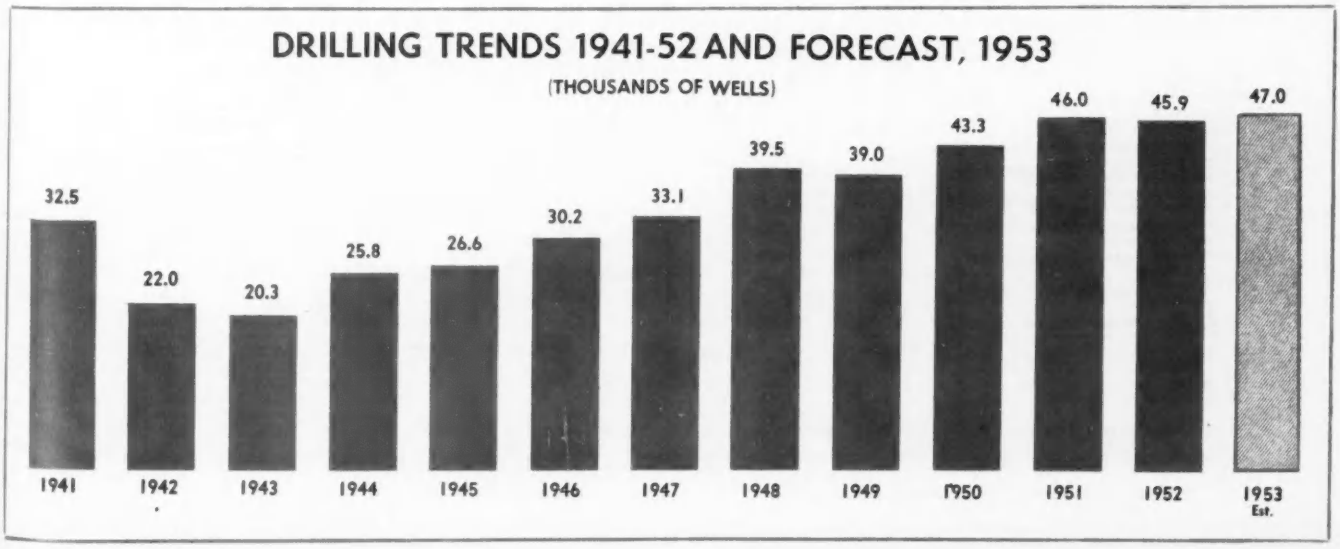
Peak Reached in '51. The forecast for drilling of 46,988 wells in 1953 compares with the previous high of 45,996 completions during 1951.

The current forecast of drilling, like its predecessors over the past 20 years, is based on a survey of individual drilling programs of numerous oil companies and independent operators. When this information is consolidated and compared with the operations of these companies in the preceding year, it serves as a valuable guide in predicting probable drilling trends in all parts of the nation. While such data are relied upon to a great extent, trends may be adjusted by the WORLD OIL editorial staff according to conditions which may affect drilling operations.

A year ago WORLD OIL forecast that drilling activity in 1952 would result in the completion of 45,967 wells. This proved to be remarkably accurate. Statistical records reveal the completion of 45,885 wells, only 82 wells or 0.18 percent less than predicted by WORLD OIL for 1952.

WORLD OIL's forecast on footage also was very close to actual results. Footage drilled in 1952 totaled 186,868,619 feet, only 1.18 percent above the prediction for 184,688,000 feet of hole.

Due almost entirely to the likelihood there will be less drilling in West Texas, it is forecast that 16,660 wells will be completed in Texas in the coming year, 735 less than in 1952.



Activity in the Panhandle, South Central and the three Gulf Coast areas is expected to be somewhat higher and to partially offset the large decrease in West Texas.

Despite reduced drilling, Texas will maintain its usual dominating position in oil activity. The 16,660 wells forecast for the state represents 35 percent of the nation's total anticipated completions. The state also is expected to account for over 78 million feet of hole, 41 percent of the country's total.

Other Gains. New Mexico, Kansas and Oklahoma are expected to show substantial gains in wells completed. A 27 percent gain is predicted for New Mexico, with the number of wells drilled rising from 1086 feet in 1952 to 1380 in 1953. The increase foreseen for Oklahoma is small from a percentage standpoint, but involves the drilling of nearly 200 additional wells. The state is expected to drill 5840 wells compared with 5685 in 1952.

Kansas completions are seen as rising from 4182 to 4410 in 1952, a gain of 5.5 percent.

Smaller but still sizeable increases are expected in California, Colorado, Louisiana, Montana, North Dakota, Wyoming and New York. A number of other states appear likely to experience small gains in drilling activity.

In addition to Texas, states likely to record less drilling in 1953 include: Alabama, Illinois, Michigan, Mississippi and West Virginia.

Wildcat drilling is expected to be up slightly in all but one of the top six wildcatting states during 1953. Forecast for Texas calls for a total of 4600 wildcats to be drilled. That would be an increase of only 0.5 percent over the 4575 recorded in 1952. Texas alone is expected to furnish 43.6 percent of the nation's activity.

Other major states expected to hike exploration are Kansas, Oklahoma, Louisiana and California, and their gains would range from 3 to 13 percent over 1952. The only leader expected to show a decline is Illinois, where forecast wildcats are 2.1 percent lower. These six areas should account for about 77 percent of the nation's total, while last year they held almost 79 percent.

Details on the 1953 forecast for total number of new wells, wildcats and footage to be drilled, together with a comparison of 1952 rates, appear in the table at the bottom of this page.

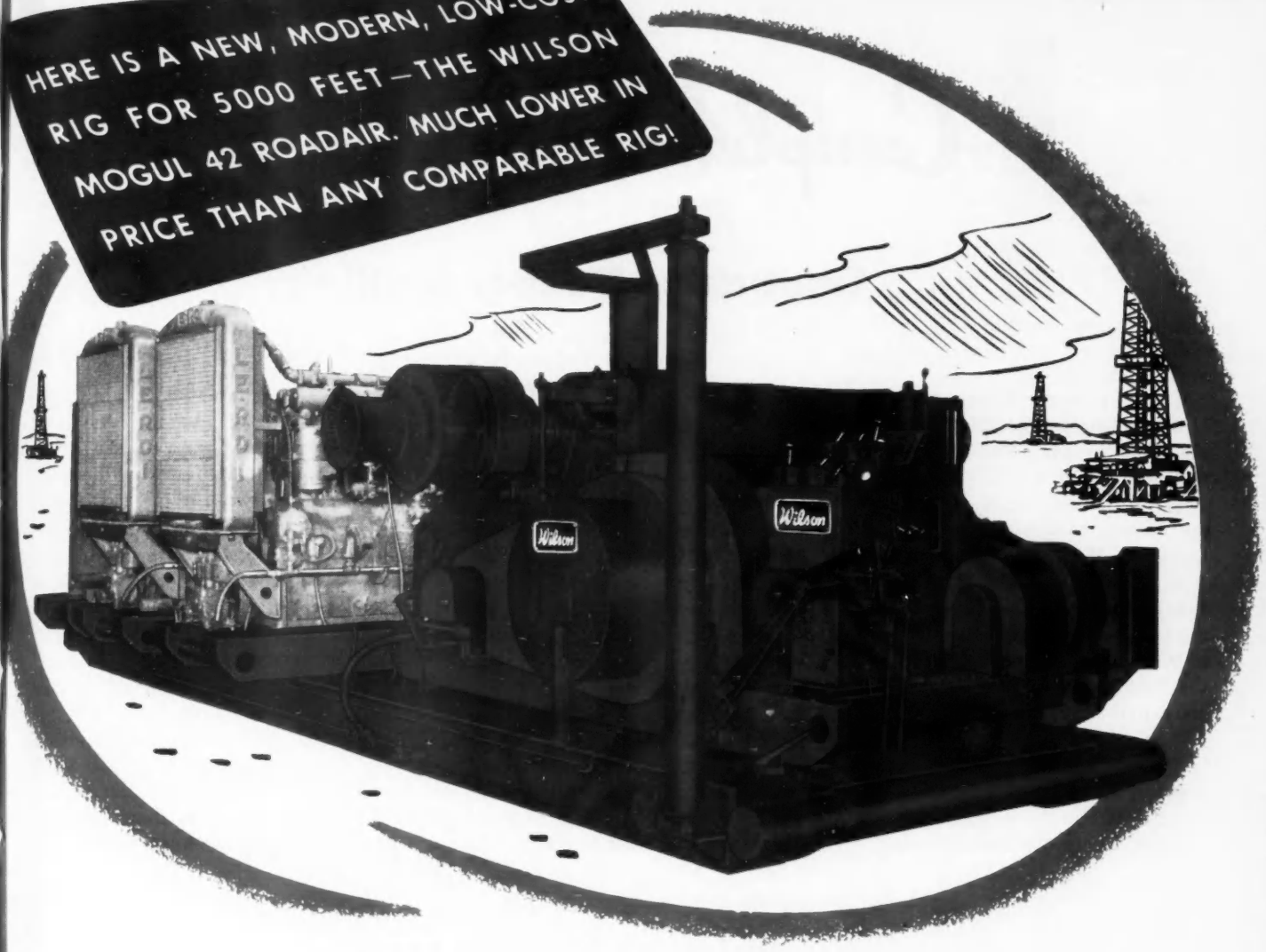
Indicated Number of Wells and Footage to Be Drilled in 1953

Forecast covers all new wells to be drilled for oil or gas in 1953, salt-water disposal wells, and water or gas-input wells for repressuring and secondary recovery, but does not estimate old wells drilled deeper.

STATE OR DISTRICT	TOTAL NEW WELLS			WILDCAT TESTS		FOOTAGE (New Wells)			
	Forecast For 1953	Drilled In 1952	Percent Change From 1952	Forecast For 1953	Percent New Wells In 1953	Forecast For 1953	Drilled In 1952	Percent Change From 1952	Percent of U.S. Total 1953
Alabama	65	75	— 13.4	40	61.5	403,000	457,085	— 11.8	0.21
Arizona	4	2	+100.0	4	....	14,400	10,755	+ 33.9	0.01
Arkansas	475	432	+ 10.0	155	32.6	1,795,500	1,615,666	+ 11.1	0.94
California	2,585	2,459	+ 5.1	446	17.3	11,218,900	10,512,469	+ 6.7	5.88
Colorado	585	483	+ 21.1	303	51.8	3,106,350	2,566,803	+ 21.0	1.63
Florida	15	9	+ 66.7	15	....	91,500	55,813	+ 63.9	0.04
Illinois	2,030	2,089	— 2.8	605	29.8	5,075,000	5,193,602	— 2.3	2.67
Indiana	1,450	1,346	+ 7.7	400	27.6	2,610,000	2,416,511	+ 8.0	1.36
Kansas	4,410	4,182	+ 5.5	1,060	24.0	15,324,750	14,511,612	+ 5.6	8.04
Kentucky	1,465	1,423	+ 3.0	175	11.9	2,783,500	2,743,044	+ 1.5	1.46
Louisiana	2,555	2,395	+ 6.7	515	20.2	17,698,800	15,862,476	+ 11.6	9.28
North Louisiana	1,285	1,309	— 1.8	250	19.5	5,011,500	5,025,892	— 0.3	2.62
South Louisiana	1,270	1,086	+ 16.9	265	20.9	12,687,300	10,836,584	+ 17.1	6.66
Maryland	8	34	— 76.5	2	25.0	32,160	136,053	— 76.4	0.01
Michigan	620	643	— 3.6	250	40.3	1,692,600	1,740,515	— 2.8	0.89
Mississippi	326	346	— 5.8	160	49.1	2,352,090	2,492,239	— 5.6	1.23
Missouri	30	30	.....	15	50.0	30,600	30,600	.....	0.02
Montana	460	324	+ 42.0	150	32.6	1,725,000	1,153,174	+ 49.6	0.90
Nebraska	290	247	+ 17.4	145	50.0	1,461,600	1,239,819	+ 17.9	0.77
New Mexico	1,380	1,086	+ 27.1	200	14.5	7,728,000	6,047,801	+ 27.8	4.05
New York	1,190	1,077	+ 10.5	5	0.4	1,648,150	1,494,239	+ 10.3	0.87
North Dakota	195	96	+103.1	50	25.6	1,647,750	805,049	+104.7	0.86
Ohio	1,075	983	+ 9.4	35	3.3	2,327,375	2,128,457	+ 9.3	1.22
Oklahoma	5,840	5,685	+ 2.7	895	15.3	22,075,200	21,449,783	+ 2.9	11.57
Pennsylvania	1,710	1,683	+ 1.6	5	0.3	2,907,000	2,851,127	+ 2.0	1.53
South Dakota	12	7	+ 71.4	12	....	44,496	25,954	+ 71.4	0.02
Tennessee	50	40	+ 25.0	20	40.0	62,500	49,600	+ 26.0	0.03
Texas	16,660	17,395	— 4.2	4,600	27.6	78,380,000	83,330,126	— 6.0	41.09
Dist. 1—South Central	880	780	+ 12.8	395	44.9	2,640,000	2,313,624	+ 14.1	1.39
Dist. 2—Middle Gulf	830	816	+ 1.7	340	41.0	5,312,000	5,185,153	+ 2.4	2.78
Dist. 3—Upper Gulf	1,850	1,743	+ 6.1	405	21.9	12,395,000	11,611,731	+ 6.7	6.50
Dist. 4—Lower Gulf-S. W.	1,630	1,611	+ 1.2	470	28.8	8,965,000	8,658,565	+ 3.5	4.70
Districts 5 and 6, East Central and Northeast	805	854	— 5.7	265	32.9	4,347,000	4,821,480	— 9.9	2.28
Districts 7-B and 9, North Central and North	5,885	5,904	— 0.3	1,855	31.5	18,832,000	18,908,345	— 0.4	9.87
Districts 7-C and 8, West Central and West	3,960	5,125	— 22.7	815	20.6	23,265,000	30,046,661	— 22.6	12.20
Dist. 10—Panhandle	820	562	+ 45.9	55	6.7	2,624,000	1,784,567	+ 47.0	1.37
Utah	105	77	+ 36.4	62	59.0	682,500	498,262	+ 37.0	0.36
West Virginia	575	582	— 1.2	5	0.9	1,667,500	1,693,129	— 1.5	0.88
Wyoming	815	654	+ 24.6	205	25.2	4,115,750	3,276,588	+ 25.6	2.15
Other States[1]	8	1	+700.0	8	....	40,000	11,543	+246.5	0.03
United States Totals	46,988	45,885	+ 2.4	10,542	22.4	190,741,971	186,399,894	+ 2.3	100.00

[1] Other states include Georgia, Idaho, Oregon, Nevada, North Carolina, Virginia and Washington.

HERE IS A NEW, MODERN, LOW-COST RIG FOR 5000 FEET—THE WILSON MOGUL 42 ROADAIR. MUCH LOWER IN PRICE THAN ANY COMPARABLE RIG!



"after all—the only thing we're talking about is MONEY"

The Mogul Roadair "42" Rig was designed to meet the need of those customers who want a rig *with compounded engines* of up to 400 H.P. total, to drill wells up to 5000 feet with 4½" pipe, without torque converters, and at the lowest total cost. This rig more completely fills all of these requirements than any rig we know. Of the 400 engine horsepower, 300 can be used on the pump and about 100 on the rotary table, and yet all 400 H.P. will be available when coming out of the hole.

The rig also has the safety and dependability inherent in having two engines, with compound, so that either can be used in the event of failure of the other. The V-belt compound is designed to use the high strength steel cord V-belts, which are run at fairly high speed, to carry relatively large H.P. in a narrow width.

It is equipped with a 118 Air-Tube disc engine clutch in a positively aligned clutch housing, which has proved so successful in other Wilson Roadair and Torcair Rigs.

The drum assembly in this rig is exactly like the regular Mogul Torcair "42" rig, which has two friction clutch drum speeds. But in addition it has a two speed jaw clutch transmission in a heavy plate case. The brake rings are "42" diameter, and brakes are 8" wide, full wrap type and cam and roller operated.

This is a fast, dependable rig, at the lowest possible cost, that will make possible *lower drilling costs than any other rig of comparable size!*

Compare Features... Quality... Prices

Wilson

MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS

Completions and Footage

Emphasize Deeper Drilling

CONTINUED EMPHASIS on deeper U. S. drilling was plainly spoken during 1952 as the total of new wells slacked off from 1951's record high even as the aggregate footage went into history as the greatest ever.

New wells finaled during the last year added up to 45,885, which was 111 fewer than the record 45,996 of the year before. But the footage came to 9,642,673 feet more for 1952 when the past year's 186,399,894 total was compared with the previous year's 176,757,221.

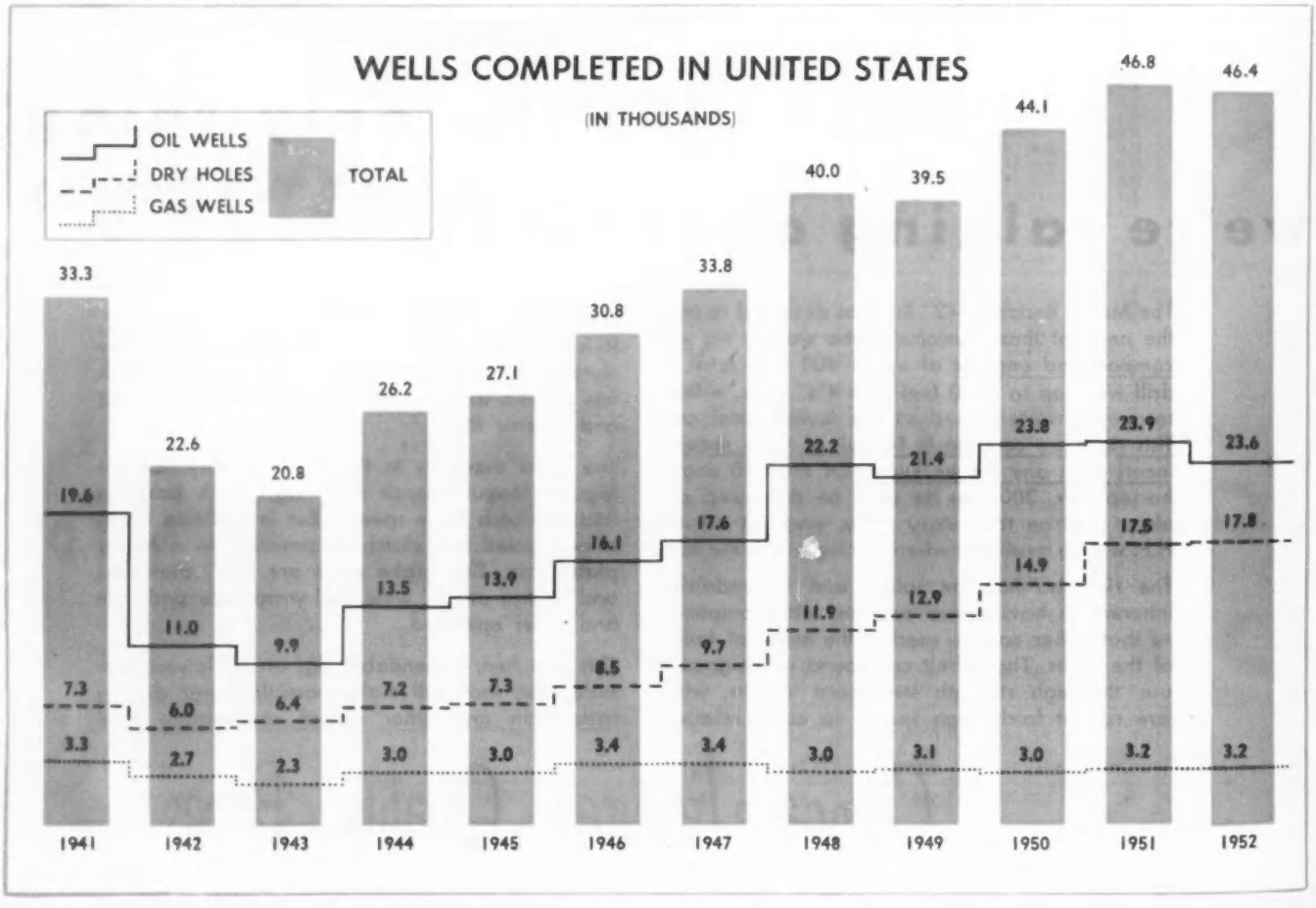
The answer lay in heightened activity in areas of deep horizons, notably the Rocky Mountains. In North Dakota, where the average depth per well last year was 8386 feet, there were 96 new wells completed in 1952 compared with ten the previous year. Utah, with an average depth of 6471, showed an increase of 41 wells; and Colorado, average depth 5314, had 184 more wells.

Deep Activity

Other deep areas whose quickening activity helped account for the footage boost were New Mexico, average depth 5569, with 369 more wells than the year before; West Central Texas, average depth 5857, with a gain of 468; the Texas Upper Gulf Coast, average depth 6662, with an increase of 201; and South Louisiana, where the 1952 average depth of 9978 was greater than in any other major oil-producing state, with an increase in new wells of 85.

Upshot of this brisk activity in areas where the bit bites deeper was that the national average well depth increased 119 feet over the 1951 average to 4062 feet. The year before that the average was 3689.

The nation's decline in wells drilled was more than explained by totals for Texas, only one of the nation's Big Four producers to have fewer tests than the previous year. Texas had 461 fewer wells than in 1951, and a further breakdown reveals that



this deficiency can be accounted for by a slowdown in West Texas (District 8), where operators' shyness toward the Spraberry helped account for 726 fewer wells last year than the year before.

Of the other Big Four states, California had 61 more wells for a total of 2459; Louisiana had 138 more for a total of 2395; and Oklahoma had 218 more for a total of 5685. New Mexico, another of the leaders, gained in 1952 for a total of 1086; but Kansas, still another top producer, slumped 137 tests to a total of 4182.

Also noticeably on the downward side in a comparison of drilling activity for the past two years were some of the Illinois Basin states. Illinois slumped 307 wells to a total of 2089; and Kentucky was down 276 to 1423; Michigan slipped 55 to 643. Ohio resisted the trend by finaling 983 for a gain of 96.

Order Your Copy of 1952 World Oil Index

The complete editorial index covering all issues of WORLD OIL published during 1952 has been prepared and is bound separately in convenient pamphlet form. It will be sent free to all subscribers who write requesting copies.

Orders should be addressed immediately to the Circulation Department, Box 2608, Houston 1, Texas, as quantities are limited.

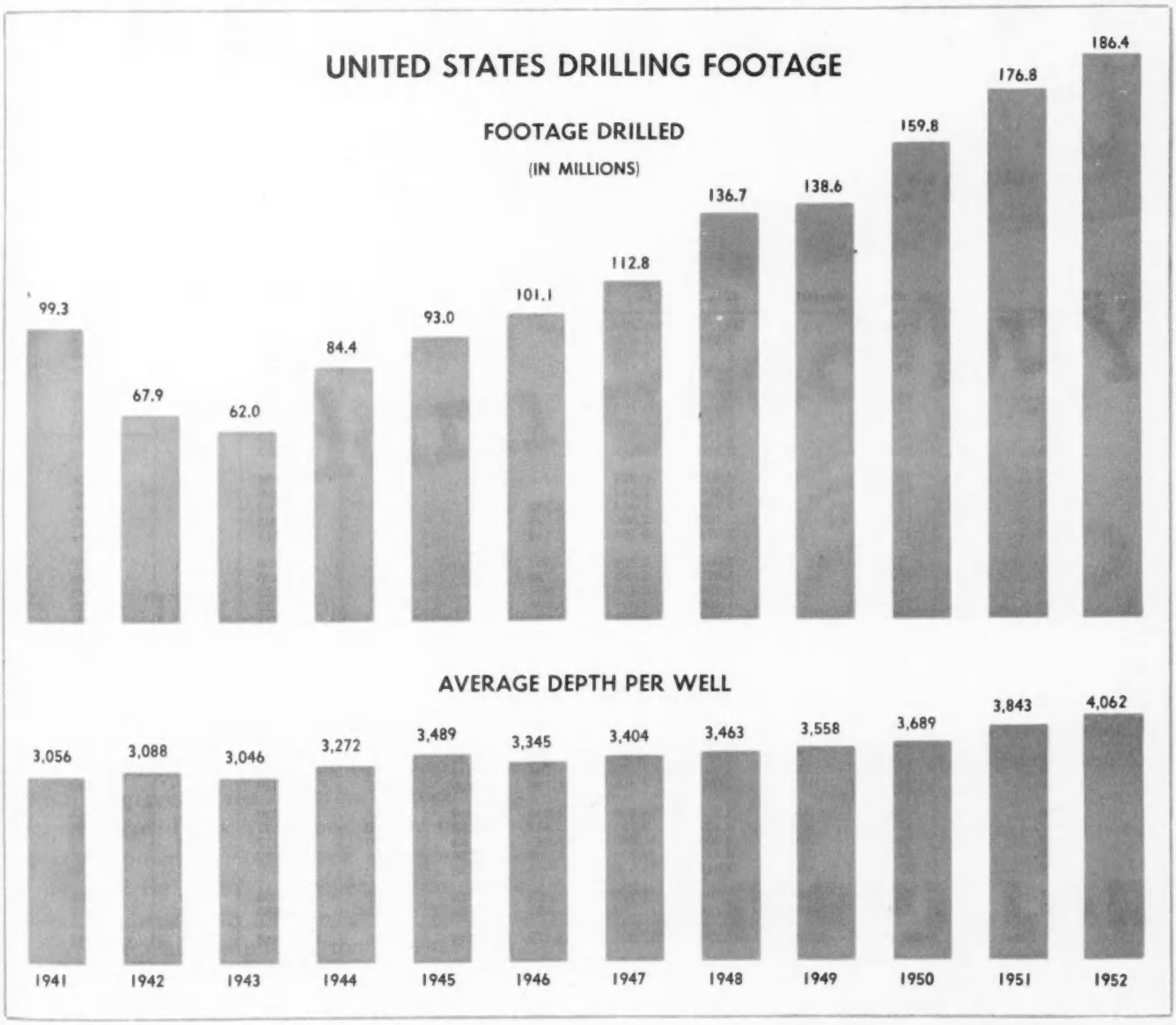
Wyoming was among the few losers in the Rocky Mountains. It completed 105 fewer wells than the year before for a total of 654.

Twenty states had 200 or more wells drilled during 1952, 15 had 500 or more, and 11 had 1000 or more.

Completions during 1952 were made up of 62 salt water disposal wells, 1161 water input, 99 gas input, and 44,563 seeking production. Of those seeking production, 23,290 produced oil, 348 produced distillate, 3166 were gas wells, and 17,759 were dry holes.

Highly significant among these figures is the total for dry holes, which were up 262 from 1951 and had increased 2579 the year before that. This growing figure has accompanied the trend toward deeper drilling and has greatly increased the industry's financial burden.

Despite its decline in wells drilled, Texas increased its footage enough to account for more than a third of the amount gained by the nation in this category. The state's footage

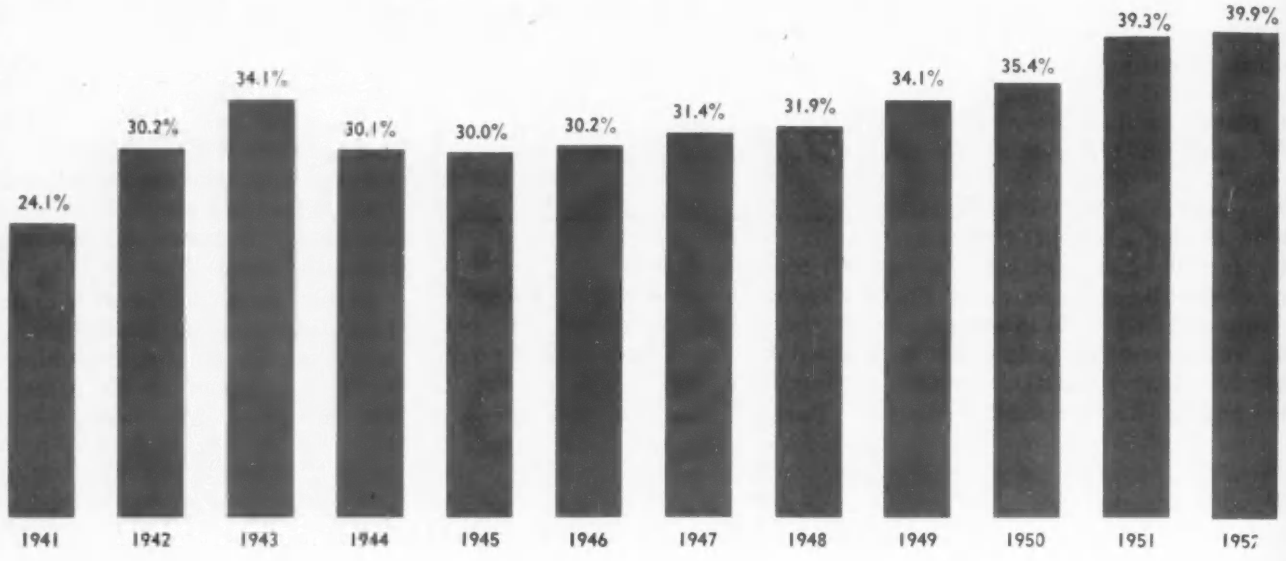


went up to 83,330,126 for an increase of 3,551,818. The other top oil producers made the footage increase unanimous. California picked up 910,164 feet, Louisiana 1,420,129, and Oklahoma 1,247,737. However, Kansas was down 342,953.

New Mexico registered the second biggest footage gain in the nation by recording an increase of 2,315,522 in bringing its 1952 total to 6,047,801.

(See table, page 138)

PERCENT DRY HOLES OF TOTAL NEW HOLES DRILLED FOR PRODUCTION

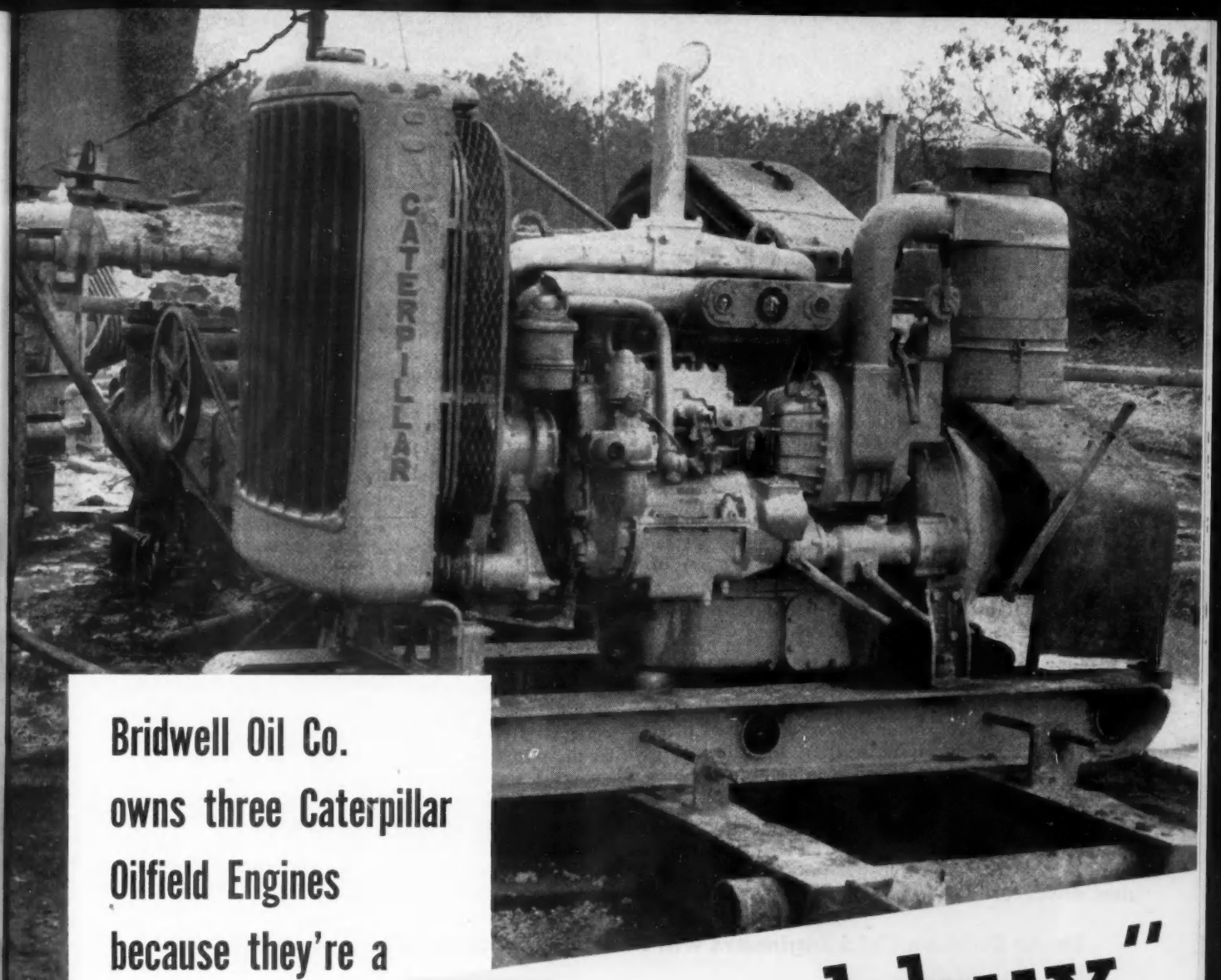


Wells Completed Annually in United States

Source: WORLD OIL and predecessor, The Oil Weekly, with aid of other authoritative sources, 1921 to now; 1920 and earlier years from U. S. Bureau of Mines and Petroleum in the United States and Possessions, by Arnold and Kemnitzer)

YEAR	NEW WELLS							Total New Wells	Old Wells Drilled Deeper	Total Completions
	Oil	Distillate	Gas	Dry	Water Input	Gas Injection	Salt Water Disposal			
1859-1917	380,502	....	20,183	91,821	.....	....	....	492,506	....	492,506
1918	17,860	....	2,324	5,629	.....	....	....	25,813	....	25,813
1919	21,041	....	2,153	6,075	.....	....	....	29,269	....	29,269
1920	24,278	....	2,275	7,476	.....	....	....	34,029	....	34,029
1921	14,715	....	2,081	5,193	.....	....	....	21,989	....	21,989
1922	17,790	....	1,926	5,191	.....	....	....	24,907	....	24,907
1923	16,182	....	2,140	6,043	.....	....	....	24,365	....	24,365
1924	14,707	....	2,172	5,591	.....	....	....	22,470	....	22,470
1925	17,029	....	2,536	6,847	.....	....	....	26,412	....	26,412
1926	18,626	....	2,502	8,328	.....	....	....	29,456	....	29,456
1927	14,382	....	2,494	7,213	.....	....	....	24,089	....	24,089
1928	12,505	....	2,754	7,154	2,342	....	....	24,765	....	24,765
1929	15,758	....	3,107	7,600	3,898	....	....	30,363	....	30,363
1930	12,133	....	2,971	6,163	2,444	....	....	23,711	....	23,711
1931	7,061	....	2,067	3,264	567	....	....	12,959	....	12,959
1932	10,569	....	1,079	3,389	799	....	....	15,836	....	15,836
1933	7,887	....	1,190	3,492	954	....	....	13,523	....	13,523
1934	13,119	....	1,496	4,811	1,696	....	....	21,122	....	21,122
1935	15,418	....	1,802	5,696	1,665	....	....	24,581	....	24,581
1936	18,704	....	2,375	5,787	2,096	....	....	28,962	....	28,962
1937	23,115	....	2,732	6,627	2,739	....	....	35,213	....	35,213
1938	19,106	....	2,143	6,515	1,363	....	....	29,127	....	29,127
1939	17,734	....	2,030	6,890	1,358	....	....	28,012	....	28,012
1940	19,843	....	2,265	7,053	1,988	....	....	31,149	....	31,499
1941	19,590	....	3,279	7,280	2,197	117	47	32,510	822	33,332
1942	10,977	105	2,685	5,962	2,141	73	47	21,990	588	22,578
1943	9,887	76	2,314	6,364	1,576	90	42	20,349	471	20,820
1944	13,502	54	3,024	7,153	1,784	218	51	25,786	377	26,163
1945	13,944	153	3,039	7,346	1,796	329	42	26,649	491	27,140
1946	16,087	207	3,355	8,496	1,816	219	50	30,230	615	30,845
1947	17,613	283	3,437	9,751	1,861	156	46	33,147	651	33,798
1948	22,197	346	2,966	11,939	1,885	84	60	39,477	533	40,010
1949	21,415	378	3,121	12,898	1,036	56	58	38,962	535	39,497
1950	23,775	465	3,015	14,918	993	38	103	43,307	751	44,058
1951	23,532	344	3,198	17,497	1,323	35	67	45,996	770	46,766
1952	23,290	348	3,166	17,759	1,161	99	62	45,885	527	46,412
Total	965,873	2,759	107,396	357,221	43,478	1,514	675	1,478,916	7,131	1,486,047

* Data for 1952 subject to slight revision.



Bridwell Oil Co. owns three Caterpillar Oilfield Engines because they're a

"darn good buy"

The Caterpillar D337 Oilfield Engine pictured above is one of three Cat Engines used by the Bridwell Oil Co. of Wichita Falls, Texas, on oil drilling operations in Jim Smith County. It powers an Ideal mud pump. The reason this new 250-HP, maximum, unit was purchased was the outstanding record made by two D4600 Engines. One of them drives a Wilson-Snyder pump, and the other powers a compressor and pumps water to the drill rig. They have operated continuously since 1935 with only one overhaul! Enthusiastic boosters for Cat equipment, the Bridwell Oil Co. also owns a Caterpillar D6 Tractor with Bulldozer.

Many drilling firms have found that it pays to standardize on rugged Caterpillar equipment for years of dependable, economical performance. They've found a valuable "plus," too, in round-the-clock service from able, well-stocked Caterpillar Dealers. To cut your operating costs, specify Caterpillar Oilfield Engines and Electric Sets for *your* rigs. See your local dealer soon.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

Oilfield Engines

To better meet Your Growing

The DENISON Engineering Company ANNOUNCES TWO NEW BRANCHES

Houston, Texas Hawthorne, Calif.

Now, with more convenience than ever, you can count on Denison HydrOILic Equipment for extra help on many different oil-field jobs — *and you can expect to get the kind of bonus performance that saves time and cuts costs.*

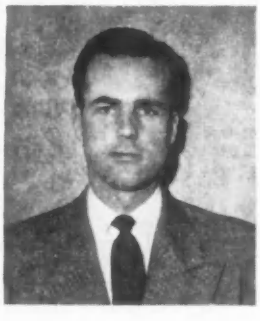
This has been proved, not only in the oil fields, but also through more than a *quarter century* of Denison's specialized experience in filling some of industry's toughest jobs for high-pressure hydraulic components, especially in the heavy industries.

Among many reasons for the *plus* performance of Hydraulic Pumps, Motors and Controls is the fact that Denison has made almost a fetish of increasing the *simplicity, compactness and ruggedness* of these units with every advance in their operating efficiency. In HydrOILics, *stamina* is as important as *function.*

Oil-field applications for hydraulic equipment include pull-down power for portable drilling rigs, closures on blow-out preventers, bug-blower operation, drives for shale shakers, water pumps, generators, mud pumps and servicing equipment reels, and many other uses too numerous to mention here.

Advantages of hydraulic equipment are almost as numerous as its uses: They offer complete fire-safety — no sparks. They can tap power already available in rotary rigs — no separate generator or other power source is needed. They cut maintenance costs on blow-out preventer equipment because hydraulic fluid is basically non-corrosive and non-abrasive. Existing blow-out hook-ups can be used without change. Blow-out preventers won't freeze. Repair and replacement costs on hydraulic pumps and fluid motors are lower than for other types of prime movers. Fluid motors offer infinitely variable speed at no extra cost, and are not affected in any way by constant starting, stopping, stalling and reversing. Smooth, fluid action of hydraulic equipment reduces wear and tear on equipment generally. There are many other ways in which Denison HydrOILic Equipment can help you get better results, save time, and reduce costs.

These Denison Field Engineers will welcome an opportunity to assist you



Denison Neale
Manager
Houston Branch

Mr. Neale has had considerable experience in the application of hydraulic components to circuit needs of every type, with special emphasis on heavy industrial requirements. Following an extensive period of specialization in the installation and servicing of hydraulic test stands used in ground-checking aircraft hydraulic circuits, Mr. Neale served as a pilot in the Air Force. Later he returned to Denison for additional training in the engineering, production and application of hydraulic equipment. As a field engineer serving manufacturers in the Midwest, he often encountered many of the specialized problems and needs in the oil industry — a field he has found unusually interesting because of its many opportunities for practical applications of hydraulic equipment.

William D. Peters
Manager
West Coast Branch

Mr. Peters has an unusually wide and varied experience in the engineering, design, and development of hydraulic products as well as in the application of oil-hydraulic methods to industrial production. He has been with the Denison Engineering Company since 1941. After several years in the Engineering Department, he was "drafted" as Sales Engineer in the Pump and Control Division, because of his excellent project development work in Denison's Test Laboratory experiments, in connection with the adaptation of hydraulics to new fields.

This phase of Mr. Peters work has also brought him in close contact with developments in Denison's Aircraft Pumps and Controls, and with the adaptation of hydraulic components to special processes in other fields.

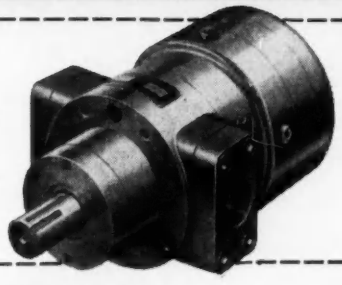
Hydraulic Equipment Needs

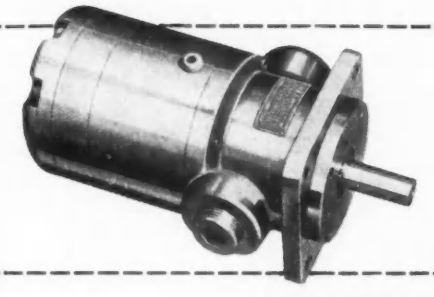
Comparison will prove to you why more and more users, year after year, insist on Denison HydrOILic Pumps, Motors, and Controls. They have proved their *extra* capacity for continuous, heavy-duty service. Many are built for 5000 psi duty, yet cost no more than other makes of lower rating. A few typical HydrOILic Components are shown below.

DENISON HydrOILics

PUMPS

Denison offers a wide variety of rugged, hydraulically balanced pumps of efficient axial-piston or vane type design, in 2000, 3000, 5000 psi capacities. Constant or variable volume delivery . . . by handwheel, stem, cylinder, pressure compensation and servo control. 3.5 to 70 gpm capacities. Face, flange or foot mountings.



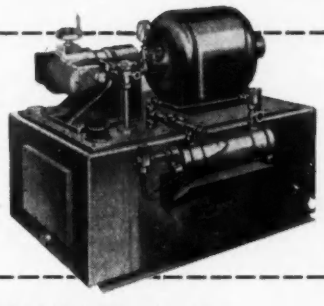


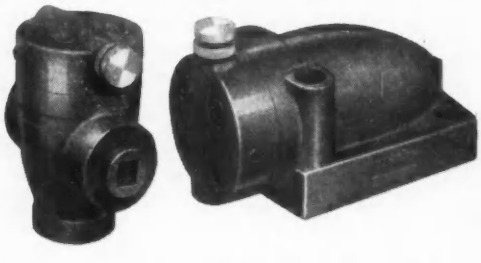
FLUID MOTORS

Denison Fluid Motors provide high torque efficiencies ranging from 13 to 257 inch-pounds per 100 psi — equivalent to 3 to 160 hp output at pressures to 5000 psi. Both axial piston and vane type motors available. Small, compact, powerful. Maximum operating speeds vary from 1200 to 3000 rpm. Face, flange and foot bracket mountings are available.

PUMPING UNITS

Denison's self-contained Pumping Units offer complete packaged circuits for every need. They feature single-panel assembly of all operating components — pump, motor and valves are mounted on reservoir top. 37 different models provide 2 to 70 gpm delivery capacities, for circuit pressures from 400 to 5000 psi. Constant and variable volume types.



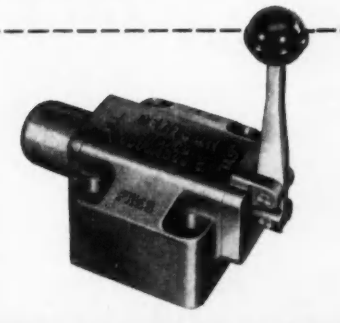


PRESSURE CONTROLS

Unusually low differential between opening and closing pressures is an outstanding feature of Denison's compound-design relief, sequence and unloader valves. Their faster action assures closer control of operating pressures. For circuits up to 5000 psi. No chatter — no pulsation. Threaded body, subplate, or flange-type mountings are available, with provisions for gauge or pilot circuit connection and remote control of pressure unloading adjustment. All sizes: 3/4" to 2".

DIRECTIONAL CONTROLS

A wide choice of porting and operating characteristics are offered in Denison's extensive line of sturdy 4-way valves for all circuit needs to 5000 psi. Seven types of controls for valve operation include manual, hand lever, mechanical stem or cam, hydraulic pilot with or without throttle control, and single or double electric solenoid, and solenoid with pilot control of spool movement. Threaded or subplate body types are available in 1/4" to 1 1/2" sizes.



The DENISON Engineering Company

HOUSTON BRANCH
1200 Bissonnet, Houston 5, Texas, Phone: Justin 6232

WEST COAST BRANCH
565 N. Prairie St., Hawthorne, Calif., Phone: Osborne 5-3230

Factory and Home Offices: 1204 Dublin Road, Columbus 16, Ohio

Footage and Average Depths Drilled in All Wells in the United States in 1952

STATE or DISTRICT	OIL			DISTILLATE			GAS			DRY			WATER INPUT			GAS INPUT		
	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth
Alabama	28	177,014	6,322				4	20,765	5,191	43	259,306	6,030						
Arizona										2	10,755	5,378						
Arkansas	203	708,181	3,489				15	54,866	3,658	214	852,619	3,984						
California	1,836	7,713,501	4,201	3	18,948	6,316	32	196,301	4,565	575	2,569,645	4,469						
Colorado	158	854,947	5,411	1	5,891	5,891	21	113,769	5,418	303	1,592,196	5,255						
Florida										9	55,813	6,201						
Illinois	809	2,081,866	2,573				17	20,727	1,219	1,260	3,082,707	2,447	3	8,302	2,767			
Indiana	477	863,083	1,809				20	24,636	1,232	845	1,523,362	1,803	3	3,911	1,304			
Kansas	1,965	6,647,496	3,383	1	7,350	7,350	301	889,060	2,954	1,882	6,843,851	3,636	1	2,765	2,765			
Kentucky	533	845,509	1,586				180	408,133	2,267	710	1,489,402	2,098						
Louisiana	1,187	6,946,184	5,852	91	957,211	10,519	223	1,577,197	7,073	893	6,377,177	7,141	1	4,707	4,707			
North Louisiana	677	1,962,394	2,899	29	260,221	8,973	121	495,387	4,094	481	2,303,183	1,788	1	4,707	4,707			
South Louisiana	510	4,983,790	9,772	62	696,990	11,242	102	1,081,810	10,606	412	4,073,994	9,888						
Maryland							23	85,917	3,736	11	50,136	4,558						
Michigan	258	840,117	3,256				30	48,170	1,606	354	850,908	2,404						
Mississippi	95	673,762	7,092	5	40,601	8,120	7	55,536	7,934	239	1,722,340	7,206						
Missouri	5	7,683	1,537				7	3,175	454	18	19,742	1,097						
Montana	147	472,100	3,212				10	19,087	1,909	166	658,830	3,969	1	3,157	3,157			
Nebraska	87	473,173					9	39,575	4,397	151	727,071	4,815						
Nevada										1	11,543	11,543						
New Mexico	537	3,646,897	5,439	5	56,453	11,291	317	1,176,279	3,711	227	1,168,172	5,146						
New York	661	913,787	1,382										416	580,452	1,395			
North Dakota	64	564,855	8,826							32	240,194	7,506						
Ohio	413	811,698	1,965				220	551,148	2,505	350	765,611	2,187						
Oklahoma	3,082	12,057,790	3,912	21	161,460	7,689	280	851,649	3,042	2,216	8,157,377	3,681	67	177,250	2,646	1	1,996	1,996
Pennsylvania	675	1,084,565					221	468,831		69	146,777	2,127	622	997,066	1,603	96	153,888	1,603
South Dakota										7	25,954	3,708						
Tennessee	3	3,720	1,607							37	45,880	1,240						
Texas	9,608	47,622,074	4,957	217	1,843,894	8,497	780	4,107,892	5,267	6,735	29,611,862	4,397	45	109,200	2,427	2	7,967	3,984
Dist. 1: South Central	329	818,779	2,489	8	68,678	8,485	18	77,178	4,288	422	1,338,096	3,171	1	5,004	5,004			
Dist. 2: Middle Gulf	286	1,782,849	6,234	41	342,143	8,345	85	475,124	5,590	402	2,568,693	6,390	1	8,829	8,829			
Dist. 3: Upper Gulf	874	5,317,333	6,084	100	903,156	9,032	98	702,658	7,170	670	4,686,772	6,995						
Dist. 4: Lower Gulf-S. W.	748	3,884,827	5,194	47	377,888	8,040	170	1,172,749	6,899	644	3,217,246	4,996	1	2,672	2,672			
Dist. 5: East Central	139	736,472	5,298	4	36,919	9,230	19	146,340	7,702	183	783,665	4,282	2	11,789	5,895			
Dist. 6- Northeast	221	1,255,923	5,683	11	76,763	6,978	74	522,662	7,063	200	1,243,498	6,217	1	7,449	7,449			
Dist. 7-B: North Central	1,251	4,029,440	3,221	3	14,118	4,706	33	98,223	2,976	1,450	4,442,294	3,064						
Dist. 7-C: West Central	1,453	9,136,054	6,288	1	6,585	6,585	11	52,021	4,729	535	2,519,605	4,710						
Dist. 8: West	2,450	14,423,326	5,887	2	17,644	8,822	14	57,234	4,088	652	3,808,948	5,842	7	25,244	3,606			
Dist. 9: North	1,636	5,559,444	3,398				27	143,665	5,321	1,467	4,556,143	3,106	32	48,213	1,507	2	7,967	3,984
Dist. 10: Panhandle	221	677,627	3,066				231	660,038	2,857	110	446,902	4,063						
Utah	20	145,837	7,292				7	35,630	5,090	50	316,795	6,336						
West Virginia	69	137,666	1,995				420	1,318,187	3,139	93	237,276	2,551						
Wyoming	370	1,853,781	5,010	4	50,289	12,572	11	48,275	4,389	267	1,316,234	4,930	2	8,009	4,005			
Total United States	23,290	98,147,286	4,214	348	3,142,097	9,029	3,166	12,114,805	3,827	17,759	70,729,535	3,983	1,161	1,894,819	1,632	99	163,851	1,65

Footage and Average Depths Drilled in All Wells in the United States in 1952

STATE or DISTRICT	SALT WATER DISPOSAL			TOTAL NEW WELLS (Preceding Classes)						OLD WELLS DRILLED DEEPER 1952 (Productive and Dry)			TOTAL ALL WELLS					
				1952			1951						1952			1951		
	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth
Alabama				75	457,085	6,094	63	277,817	5,242				75	457,085	6,094	55	278,167	5,058
Arizona				2	10,755	5,378	4	8,635	2,159				2	10,755	5,378	4	8,635	2,159
Arkansas				432	1,615,666	3,740	428	1,506,651	3,520	4	2,525	631	436	1,618,191	3,711	432	1,509,961	3,495
California	2	14,074	7,037	2,459	10,512,469	4,275	2,398	9,602,305	4,004	58	42,141	727	2,517	10,554,610	4,193	2,519	9,688,129	3,846
Colorado				483	2,566,803	5,314	299	1,490,587	5,158	2	9,945	4,973	485	2,576,748	5,313	307	1,506,727	4,908
Florida				9	55,813	6,201	3	20,425	6,808				9	55,813	6,201	4	22,109	5,527
Illinois				2,089	5,193,602	2,486	2,396	6,046,374	2,524	2	1,045	523	2,091	5,194,647	2,484	2,396	6,046,374	2,524
Indiana	1	1,519	1,519	1,346	2,416,511	1,795	1,361	2,488,645	1,829	3	2,195	732	1,349	2,418,706	1,793	1,372	2,491,868	1,816
Idaho							1	12,844	12,844							1	12,844	12,844
Iowa							3	6,232	2,077							3	6,232	2,077
Kansas	32	121,090	3,784	4,182	14,511,612	3,470	4,319	14,854,565	3,439				4,182	14,511,612	3,470	4,319	14,854,565	3,439
Kentucky				1,423	2,743,044	1,928	1,699	3,297,705	1,941				1,423	2,743,044	1,928	1,701	3,297,822	1,939
Louisiana				2,395	15,862,476	6,623	2,257	14,442,347	6,400	11	15,192	1,381	2,406	15,877,668	6,599	2,273	14,482,102	6,371
North Louisiana				1,309	5,025,892	3,839	1,256	4,849,551	3,861	8	11,668	1,459	1,317	5,037,560	3,825	1,263	4,869,818	3,856
South Louisiana				1,086	10,836,584	9,978	1,001	9,592,796	9,583	3	3,524	1,175	1,089	10,840,108	9,954	1,010	9,612,284	9,517
Maryland				34	136,053	4,002	44	184,738	4,199				34	136,053	4,002	44	184,738	4,199
Michigan	1	1,320	1,320	643	1,740,515	2,707	698	1,774,963	2,543	6	8,950	1,492	649	1,749,465	2,696	699	1,775,772	2,540
Mississippi				346	2,492,239	7,203	392	2,620,831	6,686				346	2,492,239	7,203	395	2,623,941	6,643
Missouri				30	30,600	1,020	11	8,747	795	1	102	102	31	30,702	990	11	8,747	795
Montana				324	1,153,174	3,559	271	669,400	2,470	2	3,388	1,694	326	1,156,562	3,548	278	674,615	2,427
Nebraska				247	1,239,819	5,020	240	1,048,407	4,368	1	2,475	2,475	248	1,242,294	5,009	240	1,048,407	4,364
Nevada				1	11,543	11,543	2	15,431	7,716				1	11,543	11,543	2	15,431	7,716
New Mexico				1,086	6,047,801	5,569	717	3,632,279	5,066	5	11,285	2,257	1,091	6,059,086	5,554	733	3,670,872	5,008
New York				1,077	1,494,239	1,387	933	1,369,214	1,468				1,077	1,494,239	1,387	933	1,369,214	1,468
North Carolina							3	8,006	2,669							3	8,006	2,669
North Dakota				96	805,049	8,346	10	50,306	5,031				96	805,049	8,386	10	50,306	5,031
Ohio				983	2,128,457	2,165	887	1,858,470	2,095	12	8,493	708	995	2,136,950	2,148	916	1,877,434	2,050
Oklahoma	18	42,261	2,348	5,685	21,449,783	3,773	5,467	20,202,046	3,695	137	84,311	615	5,822	21,534,094	3,699	5,622	20,328,787	3,616
Oregon							3	13,216	4,405							3	13,216	4,405
Pennsylvania				1,683	2,851,127	1,694	1,473	3,421,559	1,963	17	23,127	1,360	1,700	2,874,254	1,691	1,780	3,459,891	1,944
South Carolina							1	995	995							1	995	995
South Dakota				7	25,954	3,708	3	8,083	2,694				7	25,954	3,708	3	8,083	2,694
Tennessee				40	49,600	1,240	41	43,000	1,049				40	49,600	1,240	41	43,000	1,049
Texas	8	27,237	3,405	17,395	83,330,126	4,790	17,856	79,778,248	4,468	240	169,940	708	17,635	83,500,066	4,735	18,186	80,027,836	4,401
Dist. 1: South Central	2	5,889	2,945	780	2,313,624	2,966	609	1,761,667	2,893				780	2,313,624	2,966	642	1,773,037	2,762
Dist. 2: Middle Gulf	1	7,515	7,515	816	5,185,153	6,354	799	4,751,199	5,946	3	2,856	952	819	5,188,009	6,335	810	4,780,751	5,902
Dist. 3: Upper Gulf	1	1,812	1,812	1,743	11,611,731	6,662	1,542	9,734,649	6,313	13	21,579	1,660	1,756	11,633,310	6,625	1,552	9,757,193	6,287
Dist. 4: L. Gulf-S.W.	1	3,183	3,183	1,611	8,658,565	5,375	1,701	8,561,182	5,033	4	4,485	1,121	1,615	8,663,050	5,364	1,723	8,601,370	4,992
Dist. 5: East Central				347	1,715,185	4,943	472	2,032,763	4,307				347	1,715,185	4,943	479	2,039,183	4,257
Dist. 6: Northeast				507	3,106,295	6,127	686	3,575,635	5,212	1	2,252	2,252	508	3,108,547	6,119	687	3,578,988	5,210
Dist. 7-B: N. Central	1	4,037	4,037	2,738	8,588,112	3,137	2,810	8,207,987	2,921	13	7,447	573	2,751	8,595,559	3,125	2,832	8,234,899	2,908
Dist. 7-C: West Cent.				2,000	11,714,265	5,857	1,532	7,453,390	4,865	35	30,817	880	2,035	11,745,082	5,772	1,562	7,464,105	4,779
Dist. 8: West				3,125	18,332,396	5,866	3,851	21,839,710	5,671	166	92,938	560	3,291	18,425,334	5,599	4,016	21,912,824	5,456
Dist. 9: North	2	4,801	2,401	3,166	10,320,233	3,260	2,973	9,035,490	3,039	5	7,566	1,513	3,171	10,327,799	3,257	3,001	9,058,115	3,010
Dist. 10: Panhandle				562	1,784,567	3,175	881	2,824,576	3,206				562	1,784,567	3,175	882	2,827,371	3,206
Utah				77	498,262	6,471	36	179,445	4,985	2	3,743	1,872	79	502,005	6,354	37	180,708	4,884
Virginia							28	132,365	4,727							28	132,365	4,727
Washington							1	3,711	3,711							1	3,711	3,711
West Virginia				582	1,693,129	2,909	629	1,808,324	2,875	5	4,359	872	587	1,697,488	2,892	643	1,822,244	2,834
Wyoming				654	3,276,588	5,010	759	3,870,305	5,099	19	74,509	3,922	673	3,351,097	4,979	771	3,886,880	5,041
Total United States	62	207,501	3,347	45,885	186,399,894	4,062	45,996	176,757,221	3,843	527	467,725	8,875	46,412	186,867,619	4,026	46,766	177,420,734	3,794

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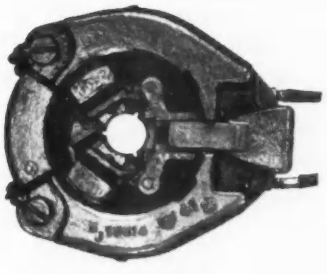


from the top...

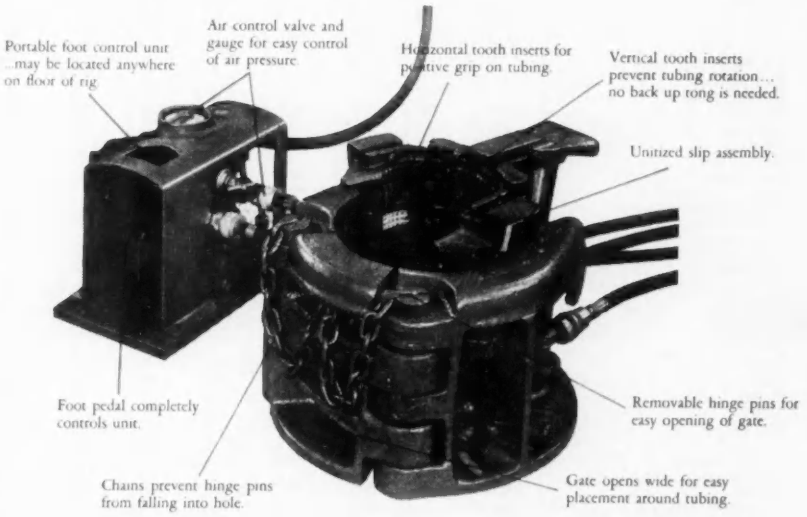
from the side...

BJ's new outstanding Power Tubing Spider is designed to give you faster, safer and more efficient operations on tubing jobs... *to put more power to work on your rig!*

BJ POWER TUBING SPIDER IS *FASTER*...the entire operation of the spider is power controlled. A touch of the foot pedal and the slips are instantly *pressure* set or *pressure* raised.

BJ POWER TUBING SPIDER IS *SAFER*...dangerous hand setting of slips is eliminated. The foot control unit may be placed in any safe, convenient location on the floor of the rig...out of the way...ready for instant action...safe! Slips are set automatically if bumped by elevator...and cannot jump out or fall in the hole.

BJ POWER TUBING SPIDER IS *MORE EFFICIENT*...crews work better when they know they are working with a safe power tool. Increased safety and faster trips mean increased efficiency for your entire operation.


Portable foot control unit ...may be located anywhere on floor of rig.
Air control valve and gauge for easy control of air pressure.
Horizontal tooth inserts for positive grip on tubing.
Vertical tooth inserts prevent tubing rotation... no back up tong is needed.
Unitized slip assembly.
Foot pedal completely controls unit.
Chains prevent hinge pins from falling into hole.
Removable hinge pins for easy opening of gate.
Gate opens wide for easy placement around tubing.

Check the BJ Power Tubing Spider *from every angle.* You'll see the new vertical-tooth inserts which eliminate the need for back up tongs. Check the sturdy hinge pins with safety chains, and the wide angle gate which allows easy placement of the spider around the tubing. Watch the fast operation of the slips and the sure grip of the extra-long replaceable tooth inserts. Slips mechanically lock in up position while running the stand. There's no crimping or bottlenecking of tubing. From every angle you'll discover that for your rig you can't buy a better tubing spider than a BJ Power Tubing Spider.

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Rigs in Operation

Gain Despite Steel Strike

DRILLING RIGS in operation in the U. S. during 1952 averaged a 0.26 percent gain over the previous year despite a steel-short slowdown near the year's end.

The year got off to a hurryup start and for each of the first six months had more than 5000 rigs in operation for the first time in history. But with July's beginning came the full impact of the steel strike and activity lunged downward, lagging behind 1951 in every month. Average for the first six months was 5066; for the second half, 4648; and for the year, 4857. This compared with 1951's monthly average of 4844, and with the 1948 average of 4950, highest of all time.

Busiest month of the recent year was May, which had 5151 active rigs. The all-time tops was in October, 1951, when there were 5260 rigs at work.

Because of the strike, the 1952 rigs-in-operation curve reversed the tradition of a slow start and a brisk ending. Only twice before in history—in May and June, 1948—had there been more than 5000 rigs in operation during any month in the first half of the year. Beginning with 5010 active rigs in January, 1952, the number increased through May, when the downward trend started and continued through August, after which activity wavered erratically. At year's end every important oil-producing state in the nation had fewer rigs in use than during the comparable period a year previously. Texas had 1899 in use in December, 1951, and 1325 in December, 1952. California had 274 in December, 1951,

U. S. Drilling Rigs in Use During 1952, by States, by Months

Figures are for end of month, and include rigs drilling, rigging up, and temporarily shut down

STATE or DISTRICT	1951		1952											
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Alabama	4	4	5	6	7	7	6	5	4	7	5	6	6	9
Arizona	2	2	2	2	3	1	3	3	3	5	4	3	2	4
Arkansas	36	33	27	33	38	43	43	41	41	43	41	36	36	28
California	275	274	265	255	253	242	244	257	247	237	261	242	253	260
Colorado	47	41	33	33	39	44	38	29	32	43	42	49	40	46
Florida	2	1	1	.....	1	1	1	1	.....	.....	1	2	3	1
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	1
Idaho	1	1	1	1	1	1	1	1	1	3	3	3	3	1
Illinois	228	189	185	169	152	198	187	208	212	175	190	201	192	181
Indiana	184	172	169	144	145	158	166	188	197	132	157	162	179	185
Kansas	433	389	419	413	442	485	509	452	412	408	403	410	442	444
Kentucky	106	87	84	88	91	110	101	83	96	84	90	102	111	86
Louisiana	247	238	222	238	230	240	241	215	217	205	218	225	237	236
North Louisiana	73	78	59	61	62	60	61	58	66	60	70	61	56	57
South Louisiana	174	160	163	177	168	180	180	157	151	145	148	164	181	179
Maryland	31	25	24	25	23	19	20	19	16	13	11	6	4	5
Michigan	114	115	113	115	101	91	95	107	108	90	89	90	88	80
Mississippi	36	37	29	27	25	31	28	35	36	32	37	37	38	35
Missouri	5	3	6	6	6	7	3	3	2	3	3	3	4	3
Montana	49	39	39	37	51	60	62	61	64	67	68	66	61	57
Nebraska	20	17	7	14	12	14	13	13	18	14	17	18	16	20
Nevada	1	1	1	1	1	1	1	.....	1	1	1	1	.....	1
New Mexico	166	177	179	169	204	188	180	188	144	169	173	180	178	189
New York	56	58	56	73	85	92	117	105	115	126	127	121	108	106
North Dakota	11	10	14	13	15	17	24	19	22	28	30	29	33	33
Ohio	156	146	147	144	147	159	163	160	169	171	171	171	163	166
Oklahoma	631	651	639	608	610	597	595	561	550	540	574	561	595	619
Pennsylvania	243	240	222	219	214	254	269	268	266	286	277	246	250	227
South Dakota	3	3	2	2	2	2	3	3	4	2	1	1	3	2
Tennessee	7	7	8	7	6	5	5	5	5	5	5	5	5	5
Texas	1,801	1,899	1,828	1,862	1,880	1,724	1,720	1,685	1,393	1,293	1,363	1,381	1,345	1,325
Dist. 1: South Central	49	43	35	42	55	42	39	32	33	33	42	46	35	39
Dist. 2: Middle Gulf	66	73	62	68	68	67	51	59	51	46	49	46	54	50
Dist. 3 Upper Gulf	122	146	148	162	162	170	145	132	127	114	134	142	131	113
Dist. 4: Lower Gulf-S.W.	122	107	104	113	118	115	97	101	103	89	92	122	104	113
Dist. 5: East Central	29	27	25	30	27	42	31	33	33	19	19	20	17	18
Dist. 6: Northeast	45	53	52	50	42	48	46	39	30	29	36	43	43	37
Dist. 7-B: North Central	188	188	170	184	187	166	178	192	137	129	137	116	143	140
Dist. 7-C: West Central	255	265	250	289	291	243	262	269	214	181	178	162	141	133
Dist. 8: West	528	568	563	517	503	448	474	408	305	288	303	343	335	327
Dist. 9: North	272	299	295	288	301	272	291	310	269	281	299	266	267	280
Dist. 10: Panhandle	125	130	124	129	126	111	106	110	91	84	74	75	75	75
Utah	33	29	25	28	23	23	29	30	30	34	26	27	29	29
Virginia	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	200	208	181	201	195	200	198	201	210	210	204	185	182	185
Wyoming	104	84	76	81	90	99	86	91	79	81	94	89	83	80
Total United States	5,234	5,182	5,010	5,015	5,092	5,093	5,151	5,037	4,694	4,508	4,687	4,659	4,689	4,649

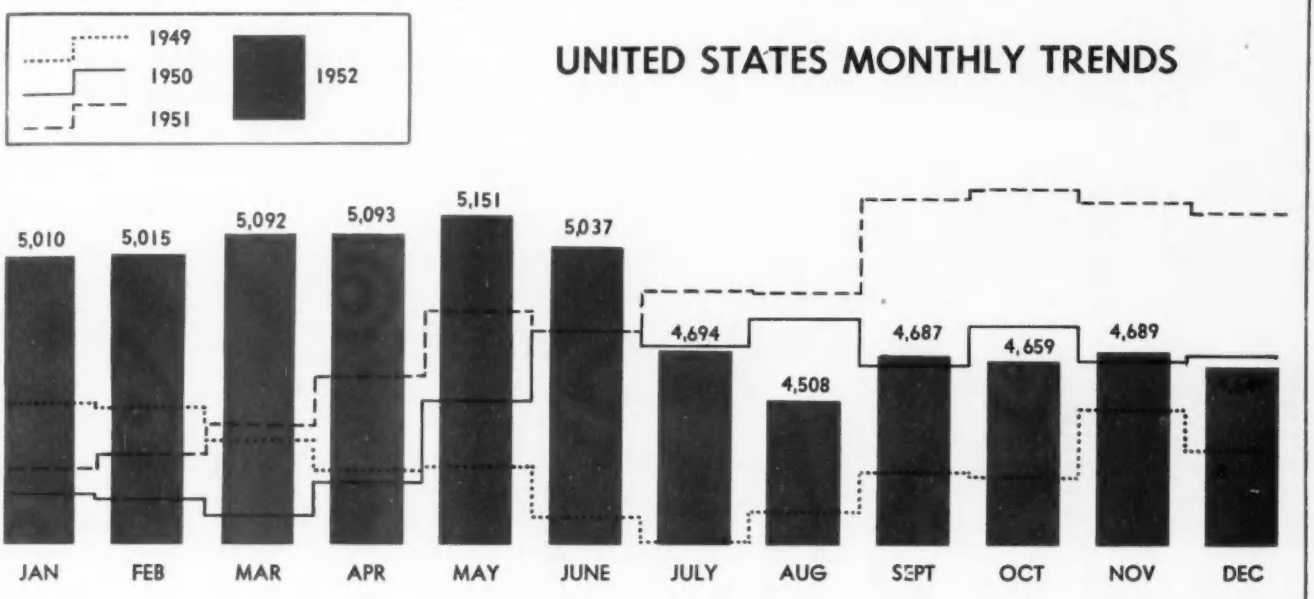
and 260 a year later. Louisiana's comparison was 238 against 236; and Oklahoma's was 651 against 619.

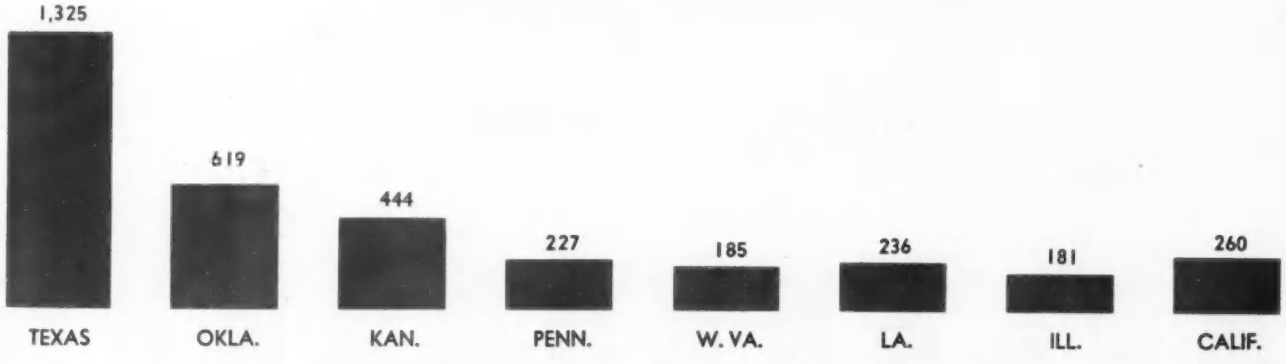
Biggest loser in Texas' big loss from December to December was District 8 (West Texas), whose 327 rigs in use at the end of last year was 241 fewer than a year before.

Areas which showed notable resistance to the slump were South Louisiana, up 19 rigs from the like period a year before to a 179 total; Kansas, up 55 to 444; Indiana, up 13 to 185; New Mexico, up 12 to 189; North Dakota, up 23 to 33; and Ohio, up 20 to 166.

The big increase in footage during 1952 and the comparatively tiny gain in rigs in use was a reflection of deeper drilling. With 4857 active rigs during the year, and a footage for all wells, including old ones drilled deeper, the per rig average for 1952 was 38,474 feet. The footage for all wells in 1951 was 177,420,734 drilled by 4844 rigs, which offers an average of 36,627 feet for each rig.

DRILLING RIGS OPERATING IN U. S.





Drilling Rigs in Use in U. S., by Years, by Months

Figures are for end of month, and include rigs drilling, rigging up, and shut down

YEAR	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1938	3,968	3,928	3,973	3,971	3,582	3,830	3,737	3,869	3,742	3,876	3,676	3,434
1939	3,583	3,391	3,448	3,630	3,695	3,726	3,567	3,718	3,625	3,905	3,981	3,924
1940	3,990	4,277	4,472	4,327	4,655	4,502	4,235	4,194	3,821	3,921	4,030	3,894
1941	3,814	3,952	4,121	4,287	4,335	4,598	4,819	4,984	4,693	4,672	4,746	4,336
1942	3,816	3,067	2,979	2,859	2,868	2,905	3,179	3,007	2,953	3,094	2,962	2,797
1943	2,691	2,653	2,732	2,756	2,743	2,852	3,015	3,201	3,031	3,548	3,676	3,595
1944	3,427	3,568	3,702	3,819	3,934	4,278	4,411	4,528	4,566	4,738	4,665	4,640
1945	4,270	4,154	4,159	4,374	4,637	4,394	4,424	4,289	4,356	4,521	4,426	4,637
1946	4,337	4,229	4,212	4,405	4,399	4,124	4,235	4,201	4,474	4,410	4,551	4,654
1947	4,390	4,402	4,379	4,470	4,603	4,802	4,992	5,163	4,979	4,897	4,871	4,945
1948	4,699	4,542	4,626	4,989	5,067	5,090	5,013	5,058	5,116	5,229	5,060	4,908
1949	4,511	4,490	4,368	4,265	4,276	4,097	4,015	4,118	4,258	4,247	4,485	4,355
1950	4,180	4,169	4,114	4,224	4,518	4,760	4,712	4,804	4,633	4,773	4,649	4,665
1951	4,275	4,339	4,435	4,600	4,831	4,762	4,989	4,988	5,237	5,260	5,234	5,182
1952	5,010	5,015	5,092	5,093	5,151	5,037	4,694	4,508	4,687	4,659	4,689	4,649

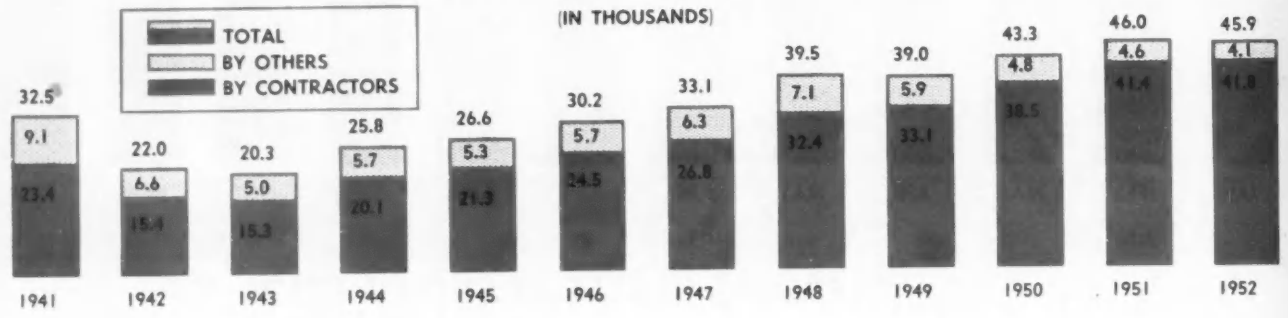
Contract Drilling

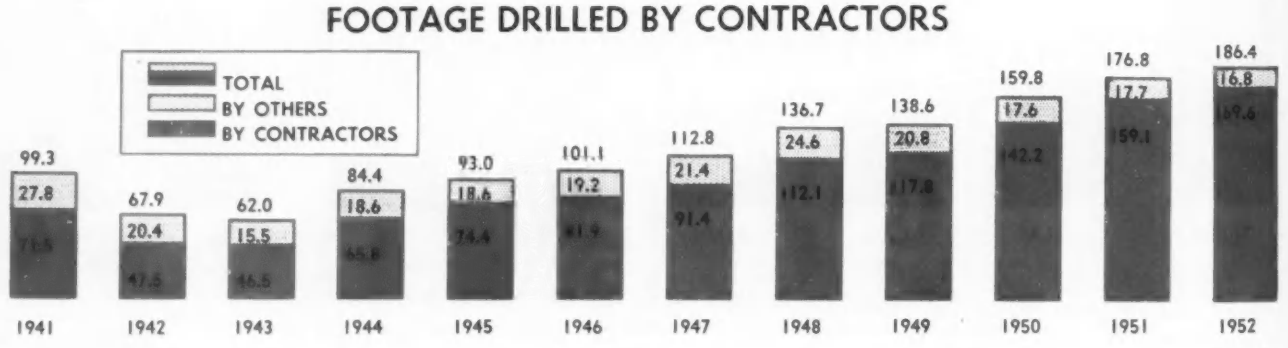
Accounts for 91 Percent of U. S. Wells

THE NUMBER of U. S. wells drilled on a contract basis increased for the tenth consecutive year in 1952 as contractors accounted for 41,755 of the nation's 45,885 new wells completed. This represented 91 percent of the total, compared with 90 percent the year before and 89 percent in 1950.

On a footage basis, the trend toward contract drilling has been even more evident. Of the 186,399,894 feet of hole drilled in 1952, 169,623,904 was by contract. This is more than double the amount of footage drilled by contractors as recently as 1946. Not until 1948 did the contractors account for more than 100 million feet of hole.

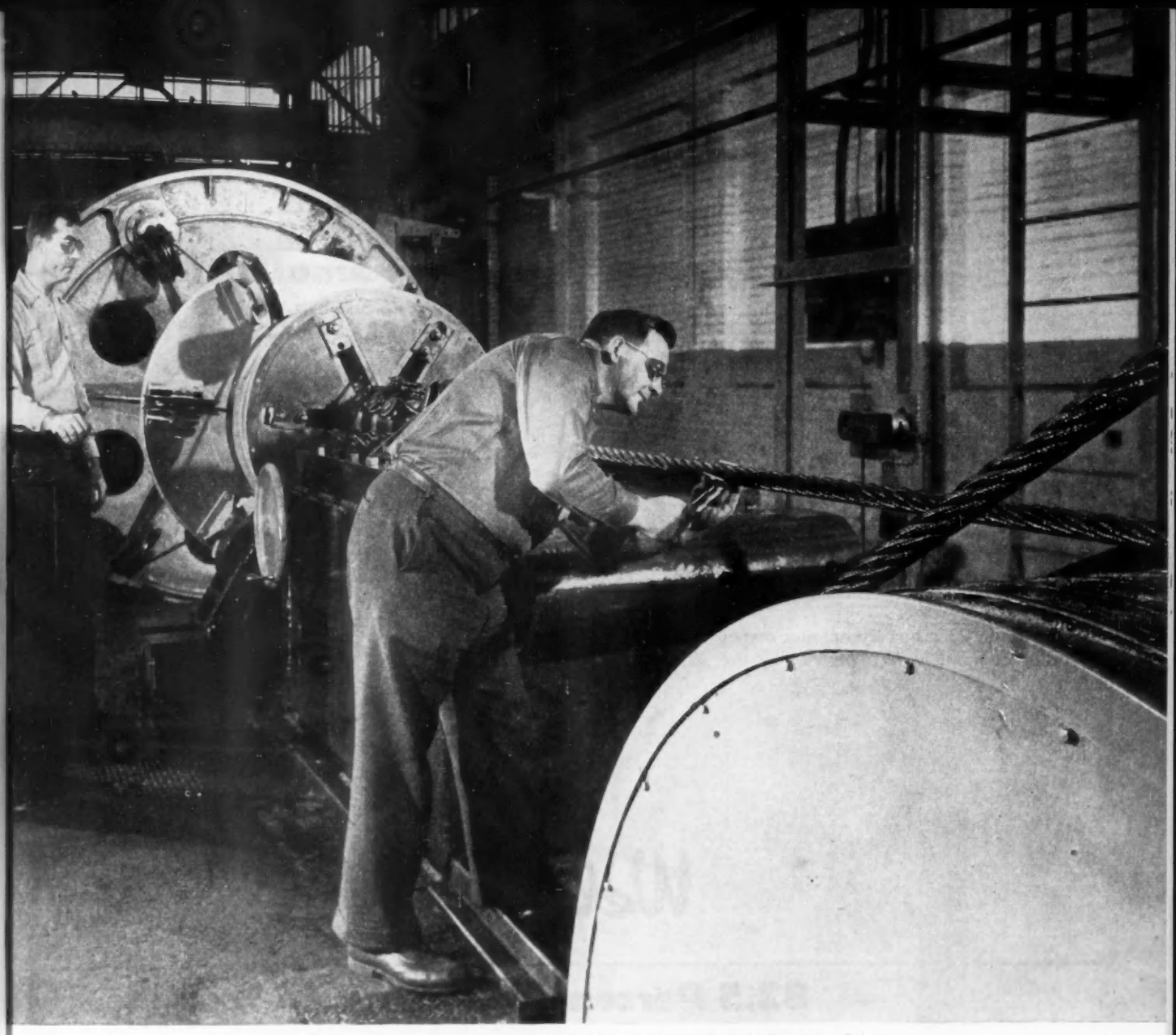
Percentagewise, the contractors have been drilling an increasing number of wells since 1942, when the total was 70 percent. In 1946 and 1947, the contractors' percentage remained stationary at 81, but in the next five years they picked up another 10 percent of all U. S. wells.





Wells and Footage Drilled by Contractors

YEAR	Total New Wells Completed	Total Footage Drilled	INDICATED WORK BY CONTRACTORS			YEAR	Total New Wells Completed	Total Footage Drilled	INDICATED WORK BY CONTRACTORS		
			Percent of Wells	Wells Drilled	Footage Drilled				Percent of Wells	Wells Drilled	Footage Drilled
1941	32,510	99,347,714	72	23,407	71,503,354	1947	33,147	112,816,124	81	26,849	91,381,060
1942	21,990	67,903,053	70	15,393	47,532,137	1948	39,477	136,709,153	82	32,371	112,101,505
1943	20,349	61,991,857	75	15,262	46,492,893	1949	38,962	138,616,941	85	33,118	117,824,400
1944	25,786	84,378,457	78	20,113	65,815,196	1950	43,307	159,761,732	89	38,543	142,187,941
1945	26,649	92,982,113	80	21,319	74,385,690	1951	45,996	176,757,221	90	41,396	159,081,499
1946	30,230	101,124,813	81	24,486	81,911,099	1952	45,885	186,399,894	91	41,755	169,623,904



Here a big wire rope emerges from Bethlehem's 66-in. closing machine. At this stage of the checking, the inspector is making sure that the diameter is within specified tolerances.

He seldom has to say "No"

Saying "no" can be part of the Bethlehem rope inspector's job. Fortunately, he seldom has to use the veto power, for Bethlehem rope is made with such care that rejects are few. But the inspector won't hesitate to stop a rope if even a minor detail is subject to question.

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In the making of this product, nothing is left to chance. That's one of the reasons why Bethlehem rope is dependable rope . . . the kind that will serve you well in the toughest sort of going.

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When you think WIRE ROPE . . . think BETHLEHEM

Wells Completed

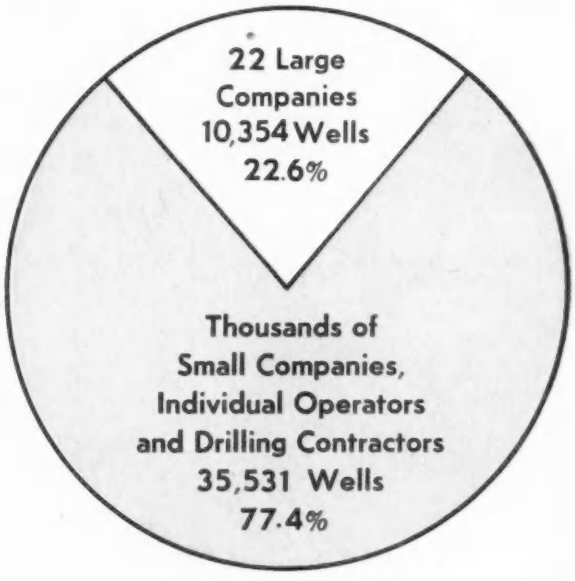
77.4 Percent Owned by Smaller Firms

LARGER U. S. COMPANIES own a decreasingly smaller percentage of the wells drilled.

Of the 45,885 tests finaled last year, 10,354, or 22.6 percent, were owned by 22 larger companies who normally produce 60 percent of the nation's oil.

Thus, smaller companies owned 77.4 percent, which came to 35,531 wells.

In 1951, the 22 larger companies owned 23.7 percent and other companies 76.3 percent of the 45,996 wells drilled.



Wells Drilled

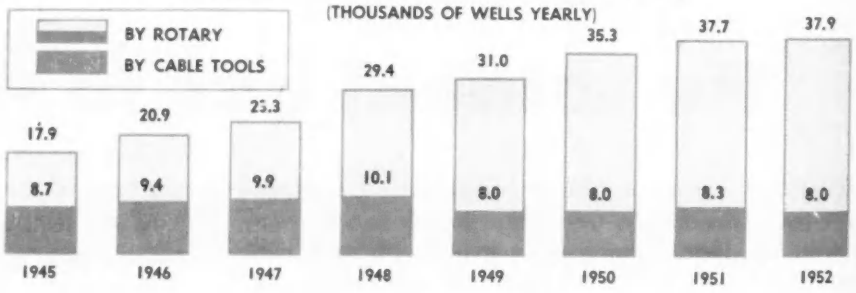
82.5 Percent by Rotary Method

THE NUMBER of U. S. wells drilled by the rotary method continued to increase last year as the total drilled by cable tool slumped back to the 1950 level.

Of the 45,885 new wells completed last year 37,855 were by the rotary method and 8030 by cable tool. Percentagewise, 82.5 percent was by rotary and 17.5 by cable tool.

The number of wells drilled by rotary rigs has continued to increase since 1945, when 67.2 percent of completions were by this method. Cable tool drilling had an increase of 267 completions in 1951, only to slump back in 1952 to a figure totaling only 18 more than were drilled by this method in 1950.

UNITED STATES DRILLING METHODS



How U. S. Wells Are Drilled

YEAR	Total New Wells Completed	ROTARY DRILLING		CABLE TOOL DRILLING	
		Percent of Total	Wells Drilled	Percent of Total	Wells Drilled
1945	26 649	67.2	17.908	32.5	8,741
1946	30,230	69.0	30,859	31.0	9,371
1947	33,147	70.2	23,269	29.8	9,878
1948	39,477	74.5	29,410	25.5	10,067
1949	38,962	79.5	30,975	20.5	7,987
1950	43,307	81.5	35,295	18.5	8,012
1951	45,996	82.0	37,717	18.0	8,279
1952	45,885	82.5	37,855	17.5	8,030

Rig Ownership

85.2 Percent With Contractors

A WIDE MAJORITY of the drilling rigs in the U. S. are owned by contractors. Of the approximately 5400 rigs in the nation, contractors own about 4600, or 85.2 percent of the total.

Included in contractors' rigs are approximately 3200 rotaries and 1400 standard, or cable tool, rigs. That ownership amounts to 86.5 percent of the rotary rigs and 82.4 percent of the cable tool rigs, since it is indicated that there are 3700 rotary rigs and 1700 cable tool rigs in the county.

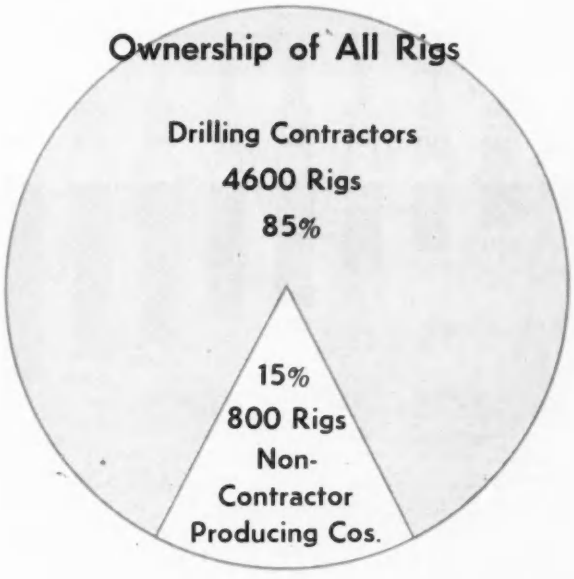
The remaining 800 rigs, consisting of approximately 500 rotaries and 300 cable tool rigs, are owned by about 200 producing companies which do not engage in contract drilling. Those companies use their rigs to drill some of their own wells.

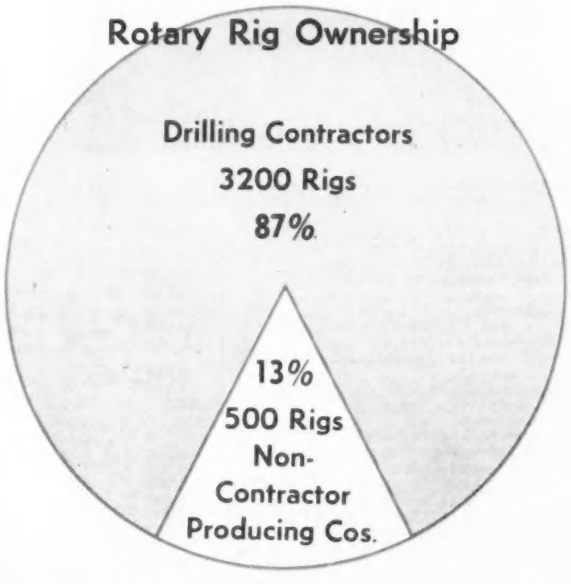
Today's costs, as well as today's value placed upon previously purchased equipment, would represent a total investment in 3200 contractor rotary rigs ranging from $800 million to $900 million.

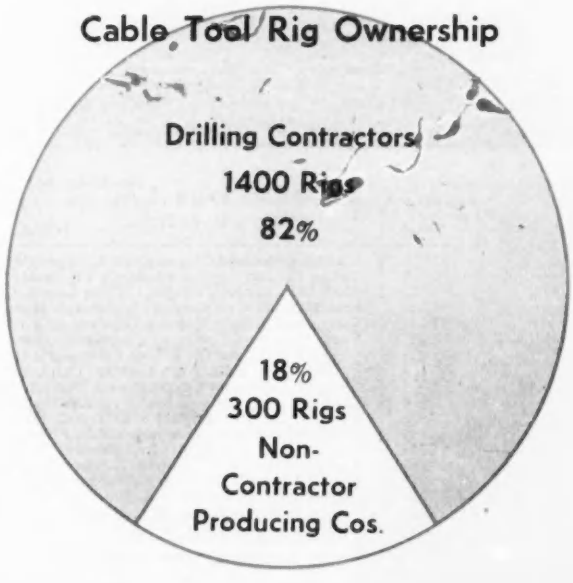
Of the approximately 5400 rigs in the U. S., 4649, or 86.1 percent, were in operation at the close of 1951. Ninety-six percent of the total was operating at the close of the previous year. At the end of last year, 13.9 percent of the total number was moving between jobs or temporarily idle.

Twelve states reported more than 100 active rigs at the end of last year. They were Texas, with 1325; Oklahoma, 619; Kansas, 444; California, 260; Louisiana, 236; Pennsylvania, 227; New Mexico, 189; Indiana and West Virginia, 185 each; Illinois, 181; Ohio, 166; and New York, 106. Total active rigs for these states numbered 4123, or 76.4 percent of the nation's total.

Percentage leaders for the nation by wide margins were Texas, with 25 percent, and Oklahoma, with 11.5 percent of the U. S. total.





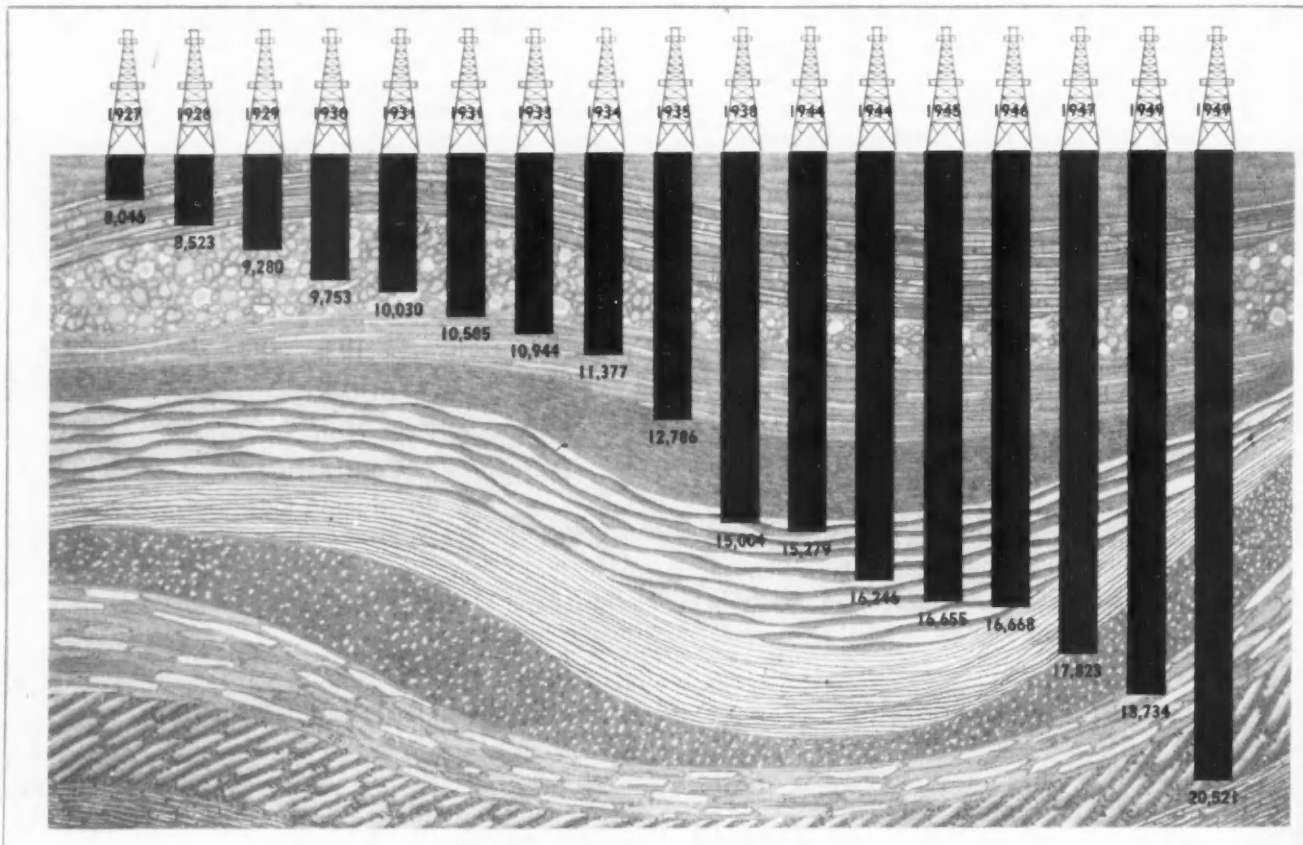


Drilling Depth Records

Set in Ten Areas

THE WORLD'S RECORD deep well in Wyoming held its position during 1952 although it was threatened throughout the year by a Mississippi well which began and ended the year just 71 feet away from equaling the record. The record holder remains The Superior Oil Company of California's Unit 1, Pacific Creek area, Sublette County, which was completed in 1949 at 20,521 feet. Close behind is the Mississippi well, George Wasen et al's Tung Oil Corporation of America 1, Stone County, which is standing at 20,450 feet.

Last year's area depth records increased to ten from nine set the previous year. Deepest was Magnolia Petroleum Company's Ragley Lumber Company, Allen Lumber Company 1-D, Allen Parish, which reached 18,660 feet. This well, which had reached 17,836 feet in the previ-



(Includes both Dry and Producing Wells)

Year	WELL and LOCATION	Feet
1927	Chansler-Canfield-Midway Oil Company's Olinda 96, Olinda, California	8,046
1928	Texon Oil and Land Company's University 1-B, Big Lake, West Texas	8,523
1929	Shell Oil Company's Nesa 1, Long Beach, California	9,280
1930	Standard Oil Company of California's Mascot 1, Midway, California	9,753
1931	Chansler-Canfield-Midway Oil Company's Hobson A-2, Rincon field, Ventura County, California	10,030
1931	Penn-Mex Fuel Company's Jardin 35, State of Vera Cruz, Mexico	10,585
1933	North Kettleman Oil & Gas Company's (later taken over by Union Oil Company) Lillis-Welch 1, Kettleman Hills, Kern County, California	10,944
1934	General Petroleum Corporation's Berry 1, Belridge, Kern County, California	11,377
1935	Gulf Oil Corporation's McElroy 103, Gulf-McElroy, Upton County, West Texas	12,786
1938	Continental Oil Company's KCL A-2, Wasco, Kern County, California	15,004
1944	Phillips Petroleum Company's Ada Price 1, Wildcat, Pecos County, West Texas	15,279
1944	Standard Oil Company of California's KCL 20-13, South Coles Levee, Kern County, California	16,246
1945	Phillips Petroleum Company's Schoeps 3, Wildcat, Brazos County, Gulf Coast, Texas	16,655
1946	Pacific Western Oil Corporation's National Royalties 1, Miramonte area, Kern County, California	16,668
1947	Superior Oil Company of California's Weller 51-11, Wildcat, Caddo County, Oklahoma	17,823
1949	Superior Oil Company of California's Limoneria 1, Wildcat, Ventura County, California	18,734
1949	Superior Oil Company of California's Unit 1, Wildcat, Sublette County, Wyoming	20,521

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3 Better Service. Ample factory, branch office, and distributor parts stocks mean minimum downtime for repairs. Skilled service men are ready to go 24 hours a day. Keeping your Le Roi engines running is a recognized responsibility.

hole fast! { *two Le Roi L3460's hoist 5" pipe from 8300 ft. on wet trip in just two hours!*

This recent experience of Jack Grace Drilling Co., Wichita Falls, Texas, is just one demonstration of what the Le Roi L3460's extra power can do. Reports from all fields show that when you need power — fast! — you can count on your Le Roi L3460's.

They are conservatively rated — have plenty of reserve power to pull you out of the tight spots. And they respond to the throttle lightning-fast for hoisting service.

Here you have oil-field power at its best: A wide speed range from 600 to 1350 rpm. Horsepower from 350 to 600 max. Lugging power at slow speeds. Compactness that helps you keep over-all width and weight limitations. Dependability and economy under continuous loads. Like all Le Roi engines, the L3460 operates on the most economical fuels in the oil fields — natural gas and butane.

Ask your rig manufacturer, supply house, or Le Roi distributor to show you L3460 and other Le Roi engine installations — or write us. See for yourself why you're way ahead of the field, when you let Le Roi's 3-way partnership work for you.

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Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company — Centralia, Illinois and St. Louis, Missouri.

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Mississippi, Arkansas and Northern Louisiana
Ingersoll Corporation — Shreveport, Louisiana, Jackson, Mississippi, El Dorado, Arkansas

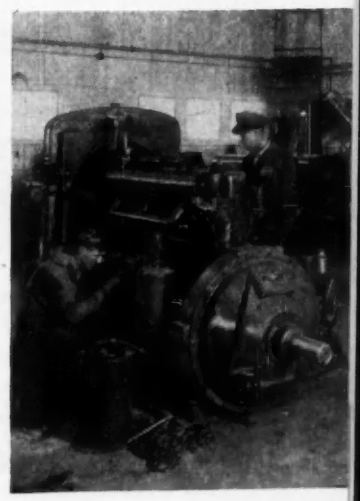
West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-114

A Typical Le Roi Service Facility



This service shop, equipped with the finest tools available for engine overhaul, belong to the Gehring Equipment Co., Casper, Wyoming. Gehring provides prompt service to an area stretching from the southern boundary of Colorado to the Canadian border. They maintain the only complete engine parts stock in the Rocky Mountain area. Emergency cases are handled by plane. It is because of service like this that you can always depend on Le Roi.

ous year, was the record for the state in 1951, too. Second deepest record in 1952 was Gulf Oil Corporation's Mitchell Bros. State 1, Presidio County, West Texas, which was still drilling beyond 15,996 feet at the close of the year. Third deepest mark reached during 1952 belonged to Humble Oil & Refining Company's Williams 1, Clark County, Alabama, which reached the Jurassic at 15,729 feet.

Two 13,000-foot level records were set last year in North Dakota and Northwest New Mexico. Amerada Petroleum Corporation's B. H. Risser 1, McKenzie County, North Dakota, was drilled to 13,773 feet. Continental Oil Company's Government 1, Rio Arriba County, New Mexico, reached 13,248 feet.

The record deep well in Arkansas which, until 1952, had been Stanolind Oil & Gas Company's Union Saw Mill 1, Lafayette County, at 11,440 feet, was bettered by 1210 feet to send that state's record holder into the 12,000-foot class. The record holder now is Shell Oil Company's Browning-Burns Unit 1, Columbia County, at 12,650 feet.

Deeper Levels

Three of the remaining four states which boasted new records in 1952 moved into deeper thousand-foot levels. Nevada climbed from the 10,000-foot group into the 11,000-foot circle with Continental's Unit 1, White Pine County, which reached 11,543 feet. New York, whose former record depth was set at 8626 feet in 1944 by New Penn Development Company's Harrington 1, Woodhull Township, Steuben County, saw the new record of 10,953 feet set last year by New York State Natural Gas Company's Kesselring 1, Van Etten Township, Chemung County, world's deepest cable tool well. Arizona's new record is 7211 feet, drilled by Sinclair Oil & Gas Company's Navajo 1, Navajo County. Arizona's former record was 6863 feet in 1950.

Four hundred and seventy-five feet deeper than the state record set 13 years ago, Superior's H. C. Ford et al C-17, White County, was bottomed at 7682 feet to establish Illinois' new mark.

Such is the trend to deeper drilling that 16 of the 46 existing area records were set since the beginning of the 1950's. Oldest area record was set in New Jersey in 1928.

Drilling Depth Records in U. S. by States and Districts

State or District	Feet	Year	Formation	Well Location and Remarks
Wyoming	20,521	1949	U. Cretaceous	Superior Oil Co. of California's Unit, Pacific Creek area, Sublett County. World's deepest.
Mississippi	20,450	....	.....	George Vasen et al's Tung Oil Corp. of America 1, C SW NE 9-2s-11w, Stone County. Standing.
California	18,734	1949	U. Miocene	Superior Oil Co. of California's Limoneria 1, North Montalvo area, Ventura County.
South Louisiana	18,660	1952	.....	Magnolia Petroleum Company's Ragley Lumber Co. 1-D, C, SW NW 29-5s-7w, Allen Parish.
Southwest Texas	17,966	1951	.....	Superior Oil Company of California's Minnie S. Welder 27, Portilla field, San Patricio County.
Oklahoma	17,823	1947	Pennsylvanian	Superior Oil Company of California's Weller 51-11, in 11-8n-12w, Caddo County.
Upper Texas Coast	16,655	1945	L. Cretaceous	Phillips Petroleum Company's Schoeps 3, Millican salt dome area, Brazos County.
East Texas	16,347	1949	Smackover	Humble Oil & Refining Company's R. P. McWatters 1, Freestone County.
Lower Texas Coast	16,006	1947	Frio	The Texas Company's Yturria L. & L. Co. 6, Raymondville area, Willacy County.
West Texas	15,996	....	.....	Gulf Oil Corporation's Mitchell Bros. "State" 1, TWNG Survey, Presidio County. Still Drilling.
Alabama	15,729	1952	Jurassic	Humble Oil & Refining Company's Williams 1, in 10-3n-2e, Clark County.
Florida	15,455	1947	L. Cretaceous	Gulf Refining Company's State of Florida 1, Big Pine Key area, Monroe County.
South Central Texas	15,301	1945	L. Cretaceous	Quintana Petroleum Company's South Texas Syndicate 3-D, McMullen County.
Colorado	15,041	1951	.....	Mountain Fuel Supply Company's Unit 1, Hiawatha field, Moffat County.
North Louisiana	14,967	1947	Salt	Cotton Valley Operators Committee's A. G. Oliphant-S. Banks 2, Cotton Valley field, Webster Parish.
New Mexico—SE	14,865	1950	Ellenburger	Humble Oil & Refining Company's Federal-Wiggs 1, in 31-24s-27e, Eddy County.
Texas Panhandle	14,278	1949	Arbuckle	Gulf Oil Corporation's F. Porter "A" 1-E, Section 413, Block 43, H&TC Survey, Lipscomb County.
North Dakota	13,773	1952	Red River	Amerada Petroleum Corporation's B. H. Risser 1, in 12-149n-96w, McKenzie County.
Utah	13,766	1949	Pennsylvanian	Pacific Western Oil Co. & Equity Oil Company's Unit 1, 33-21s-21e, Grand County.
North Texas	13,352	1947	Simpson	Denver Producing & Refining Company's Rich 1, Grayson County.
New Mexico—NW	13,248	1952	.....	Continental Oil Company's Government 1, in 6-28n-2w, Rio Arriba County.
Idaho	12,844	1951	.....	Phillips Petroleum & Utah Southern Oil Co.'s Unit 1, Juniper Anticline, Oneida County.
Arkansas	12,650	1952	Smackover	Shell Oil Company's Browning-Burns Unit 1, Columbia County.
Pennsylvania	12,321	1951	U. Silurian	The California's Company's Bennett 1, Davidson Township, Sullivan County.
Nevada	11,543	1952	.....	Continental Oil Company's Unit 1, NW NW 32-20n-60e, White Pine County.
Montana	11,519	1949	Cambrian	Shell Oil Company's Crow Tribal 7904-1, in 36-9s-37e, Big Horn County.
Michigan	11,012	1948	Cambro-Ord	Ohio Oil Company & Pure Oil Company's Reinhardt 1, West Branch field, Ogemaw County.
Washington	11,002	1947	.....	Standard Oil Company of California's Alderwood Commission 1, Snohomish County.
New York	10,953	1952	.....	New York State Natural Gas Company's Kesselring 1, Van Etten Township, Chemung County.
North Carolina	10,054	1946	Granite	Standard Oil Company of New Jersey's Cape Hatteras 1, Dare County.
West Virginia	10,018	1941	Queenston	Hope Natural Gas Company's C. S. Gribble 2-8517, Grant District, Harrison County.
Virginia	9,936	1949	Ordovician	The California Company's Kipps Anthracite Coal Company 1, Montgomery County.
South Dakota	9,348	1951	Granite	Shell Oil Company's J. T. Homme 1, in 13-20n-12e, Perkins County.
Oregon	9,263	1946	.....	The Texas Company's Cooper Mountain 1, Washington County.
Kansas	8,243	1947	Arbuckle	Stanolind Oil & Gas Company's Feathers 1, in 15-35s-33w, Seward County.
Maryland	8,165	1941	Helderburg	William Snee's Schartzer 1, Accident District, Garrett County.
Nebraska	7,998	1951	Morrison	Gulf Oil Corporation's Nels Miller 1, C SW SW 7-12n-58w, Kimball County.
North Central Texas	7,980	1945	Ellenburger	Humble Oil & Refining Company's C. H. Tompkins 1, T&P RR Survey 169, Parker County.
Ohio	7,889	1933	Clinton	Benedum and Tree's Knowlton 1, Independence Township, Washington County.
Illinois	7,682	1952	Shakopee	Superior Oil Company's H. C. Ford et al C-17, C SW SE 27-4s-14w, White County.
Georgia	7,490	1944	Cretaceous	Stanolind Oil & Gas Company's J. H. Pullen 1, Mitchell County.
Arizona	7,211	1952	Granite	Sinclair Oil & Gas Company's Navajo 1, Navajo County.
Kentucky	6,686	1949	Knox	Pure-Ashland & I. B. Browning's M. L. Walker 1, in 22-N-24, Webster County.
Indiana	6,408	1946	Trenton	Continental Oil Company's Cooper 1-D, Griffin field, Gibson County.
Tennessee	5,750	1947	Granite	The California Company's E. W. Beeler 1, in 4-15s-29e, Giles County.
Iowa	5,305	1930	Cambrian	Oil Development Company's Wilson 1, Page County.
New Jersey	5,022	1928	Granite	W & K Oil Company's Well 1, Jackson Mills area, Ocean County.
Missouri	4,740	1941	Cambrian	Strake Petroleum Company's T. P. Russell 1, Pemiscot County.

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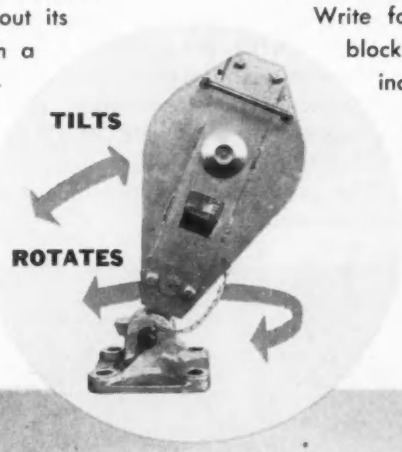
PEDESTAL SHEAVE BLOCK

BIW equipment is engineered with one idea in mind: to let you work over your wells in the most economical way. The BIW Pedestal Sheave Block is mounted on a base on the derrick floor and used in conjunction with tractor or hoisting winch for pulling rods or tubing or for swabbing. The block tilts 45 degrees each way from vertical and rotates about its vertical axis 22 degrees each way from a central position. In this way you get maximum pulling power from your winch with less wear on the wire line because there is no line rubbing on sheave edges or side plates.



TYPE NR-30 FLOOR BLOCK

The NR-30 can be installed anywhere: chained to the derrick foundation, anchored to a "dead man," or fastened down in any desired method where a concrete foundation has not been poured. This block is used with tractor or hoisting winch for swabbing and for pulling rods and tubing at medium depths. Write for the complete story on what these blocks can do to cut your drilling costs, increase your drilling efficiency. Beaumont Iron Works, one of the oldest oil country manufacturers, builds a complete line of drilling and producing equipment.

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New Drilling Equipment

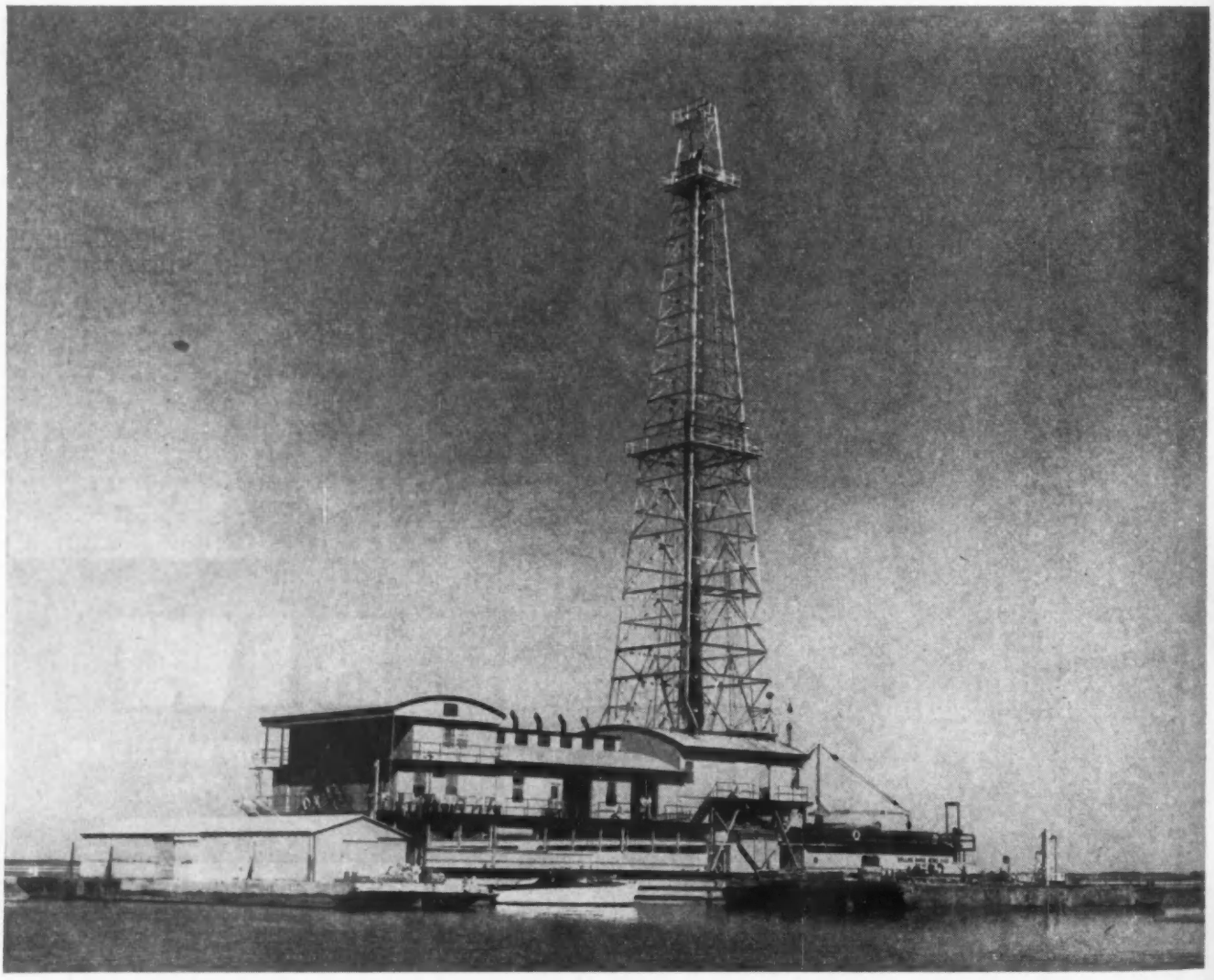
Reflects Industry-wide Cooperation

By C. H. ALCORN, Vice President,
Falcon-Seaboard Drilling Company, Houston

DEVELOPMENT OF new and improved drilling equipment in 1952 has lead to the solution of many current drilling problems—what to do about lowering drilling costs, and how can we dig deeper, faster? The happy situation is this—give the petroleum industry a problem, and it will be solved by industry-wide cooperation among contractors, oil companies, progressive manufacturers and supply companies. This cooperation allows the industry to anticipate 30,000 foot drilling in the near future.

The past year's equipment contributions included:

Improved chert bits
Vibration bits
High-speed bits
Graphite additive in drilling mud
New drill collar joint
Drill collar stabilizer
Removable casting protector
Accepted use of 700-horsepower



Blind Pass, one of the newest and most modern drilling barges completed in 1952, contains many of the year's innovations in equipment.

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CIRCULATING VALVE

The most Positive and Versatile ever used!

Here's the newest addition to the Johnston Testing Assembly. It's the Johnston Sleeve Type Circulating Valve, for *Safer*, more *Conclusive* Drill Stem Testing. It is announced only after many hundreds of successful runs under many varying conditions in fields throughout the United States.

The Johnston Sleeve Type Circulating Valve is the answer to the Drilling Industry's demand for a circulating valve to be used for reverse circulating out the recovery on Drill Stem Tests with these qualifications:

1. **Insert at any desired point in the drilling string to allow circulation at that point.**
2. **No pump pressure applied to the top of fluid recovered on test; no pollution of fluid from test zone.**
3. **Minimum obstruction of inside of drill pipe — The Sleeve Type Circulating Valve provides a minimum of 1¾" of opening inside both 4½" and 3½" drill pipe.**
4. **Positive — No manipulation of the pipe required to operate the valve. A special type go-devil is the operating medium.**

For complete details and engineering data write for the Treatise entitled "Reverse Circulation in Drill Stem Testing."

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SERVICE BRANCHES IN ALL ACTIVE AREAS

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slush pumps
Introduction of method of compounding pumps
Rubber-on-iron plug valve
Automatic feedoff controls
Nitrogen impact jar
Torque makeup tools
New drilling barges

Tungsten Carbide Bits. An important contribution was the introduction of the tungsten carbide insert bit (Figures 1 and 2). These bits were designed for extremely hard rock and chert drilling. They have proven quite successful. Under perfect conditions of 100 percent chert, the bit may make ten times as much hole as an ordinary hard, rock bit. Under varying rock hardness, the bit may make 2 to 8 times as much hole, and so on. The depth of the hole and the amount of time and work consumed in round trips to change ordinary, hard, rock bits would determine the economics of using these special bits. Bit manufacturers are improving their conventional rock bits by new tooth construction, new nozzle design, new hard surfacing materials and application.

Vibration Bits. A look into the future reveals what research is doing for the products of tomorrow. Drilling Research, Inc., is making tests on a vibration bit. The results to date are promising. The Southwestern Research Institute in San Antonio, Texas, in co-operation with Drilling Research, Inc., is running further tests on the latest design of a percussion or vibration bit.

Southwestern Research Institute also is carrying on laboratory experiments with a low torque, high speed bit using weights of 2000-3000 pounds and bit speed up to 4000 revolutions per minute. They use a mud engine to develop the desired speed of the bit. Mud and gas turbines also are receiving trial runs. But results are not yet conclusive.

Drilling With Gas. Drilling oil or gas wells with compressed air or natural gas holds possibilities for certain areas. Spectacular results have been shown on test wells in which substantial reductions in drilling time and rock bits have been noted from using gas as a drilling media as compared to mud circulation methods.

Graphite-Mud Additive. Through the cooperation and research of American Petroleum Institute committees on drilling fluids, American Petroleum Institute study groups, American Association of Oilwell Drilling Contractors mud study programs, oil company engineers and mud supply companies, progress has been made on mud control.

FIGURE 1.
Cutters of R-1 bit studded with hemispherical-ended cylinders of sintered carbide.

FIGURE 2.
This view shows general design of Cobra bit. Notice two jet-type slush nozzles that direct mud circulation to bottom of hole.

One new development in a mud-add mixture is the use of graphite. Graphite is being added to regular drilling mud to lubricate pump parts and the outer surface of drill pipe. As you know, graphite tends to plate on working surfaces. The most common practice is to use about six pounds per barrel of morpheous graphite, 88 percent carbon and passing a 325-mesh screen. Experience has indicated that about 200 pounds of graphite must be added daily to the average mud system to maintain original concentration.

The imprudent or impractical use of certain advance mud knowledge can be very expensive and add to the costs of wildcat wells, especially. First, too little mud and chemicals can be used and cause expensive blowouts. Second, too much mud and chemicals can be used and drilling costs increased by:

- Slowing down the rate of penetration.
- The increased cost of maintaining heavier weight mud and lower water loss than is necessary or a special type mud such as a lime base mud. Many wells may use lime base muds when water base muds would be satisfactory and much cheaper. Many wells are being drilled in West Texas to a depth of 7000 feet using clear water with great saving in time.

To help reduce the overall cost of wildcat drilling, careful thought and study should be given to the mud program.

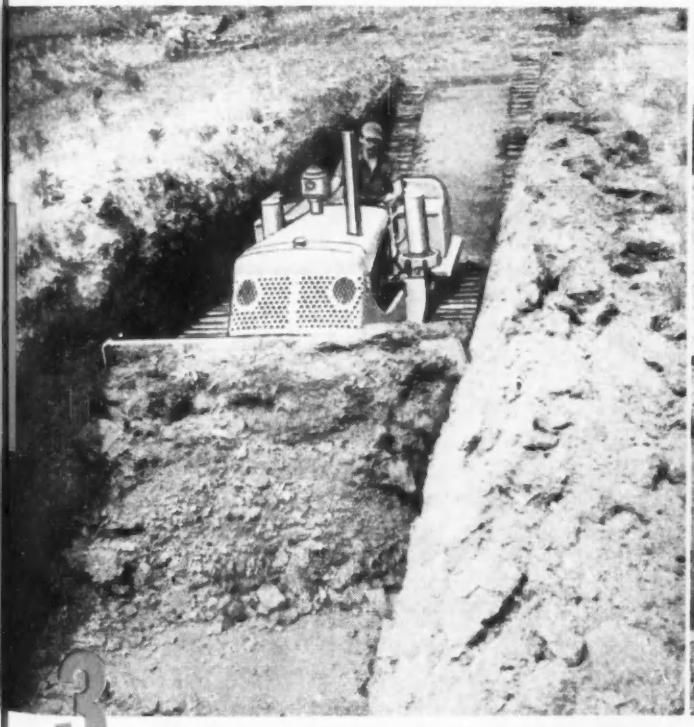
New Drill Collar Joint. The first string of drill collars with the newly designed joint by the American Petroleum Institute Sub-committee on Standardization of Drill Collars has been used on two wells in Oklahoma for 3000 rotating hours. An inspection and magnetic particle test was made recently on the 15 6½-inch collars and they were found to be perfect.

Shell Oil Company's West Texas area bought the second string of 15 6¼-inch OD collars. Inspection of these collars made after 514.5 hours of service on January 15 showed small cracks, corrosion pits and heavy tool marks in two pins and five collars. All cracks except in three collars were disposed of by grinding. All occurred in the relief grooves of the collars. Corrosion in West Texas, of course, presents a real problem with drill collars and drill pipe. While it is too early to tell much about these new joints, they look promising.

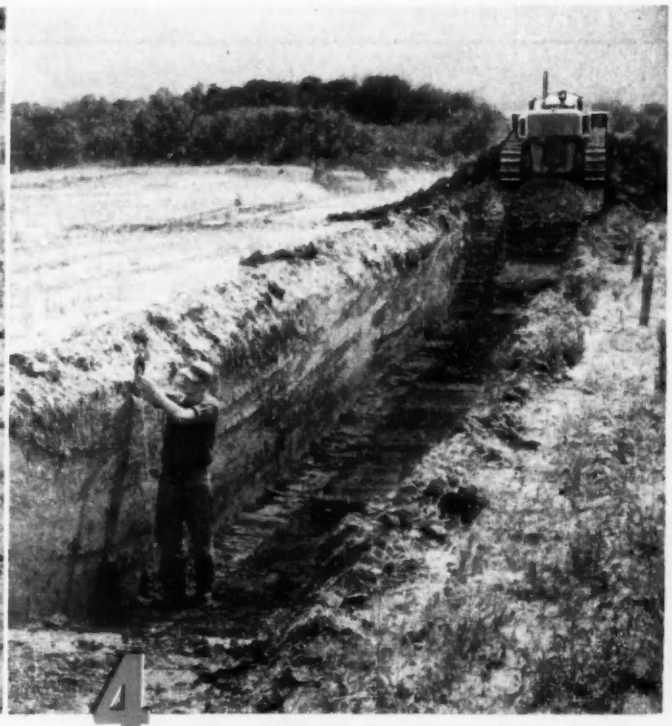
Drill Collar Stabilizer. A new cast iron sleeve-type drill collar stabilizer, (Figures 3 and 4) has been developed in West Texas and has proved to be

1. Starting the cut. Blade is mounted directly to HD-9 Tractor main frame. This provides a steeper penetration angle and with tractor-dozer lowered as a single unit there's real down pressure to bite into hard material. Because this new type mounting provides extra clearance, greatly increased track oscillation and better balance, this team is a phenomenal performer in mud and tough going.

2. Down she goes—fast. Note how steep blade angles reduce length of ramp — saves time, cuts waste of long approaches. For example, it gets down to a six-ft. depth with only an eight-ft. approach, eleven-ft. exit. And with no push beams blade is 1,150 lb. lighter than standard dozer. Costs less to buy, costs less to use.



3. Deep, narrow blade, powerful tractor hurries the job. With blade six inches higher than standard model, it handles a bigger vertical load. This, plus its narrow width, makes it ideal for digging the deep, narrow slush pit which drillers want. And the HD-9 Tractor with its powerful GM 2-cycle diesel engine and long, wide-tread tracks, provides the power and traction to ram out yardage in short order.



4. And here's your pit—finished in the shortest possible time. Just by pulling a single lever, operator can shift from any of the six forward speeds to any of the three reverses. And by using the high-speed reverse he can back up in a hurry—reduce waste time to a minimum. The combination of this HD-9 Tractor and the special 9X blade makes an unbeatable slush pit team.

helpful in drilling a straighter hole through crooked zones.

The design makes it feasible to wash over the stabilizer, should it become necessary. This is a feature other stabilizing devices do not have. In it's most frequent application, four cast iron stabilizer sleeves are installed on the bottom drill collar, spaced by steel shrink bands. These cast iron stabilizers, each 18 inches long, are free to rotate on the collar and have limited axial travel. The spiral ribs of the outer surface provide continuous wall contact while allowing ample fluid circulation. The stabilizers are machined ⅛-inch smaller than the bit in use, and in the hard formations of West Texas rerun in and out of the hole freely.

FIGURE 3.
One-way locking device on cast iron stabilizer sleeve to hold sleeve stationary on collar if it becomes necessary to cut over drill stem with wash pipe and conventional rubber shows.

FIGURE 4.
Drill collar stabilizer with four cast iron sleeves installed. This assembly to be run as bottom drill collar.

Removable Casing Protector. A new, quickly removable rubber casing protector for drill pipe is on the market. The principle purpose of this protector, besides protecting the casing against wear, is to allow switching of protectors on drill pipe, thus making it unnecessary to lay down and pick up whole joints of drill pipe in order to keep the protectors on the right drill pipe in the casing string. This saves time.

Use of 700 Horsepower Mud Pumps. Slush pumps in the 700 horsepower class were manufactured prior to 1952, but were more widely used last year. A number of pump manufacturers now manufacture power pumps in this class. With the advent of deeper drilling in 1952 and the economic necessity of faster drilling rates, new requirements have been placed on increasing hydraulic horsepower. The use of these pumps has reduced drilling time at all depths. A careful study of all factors involved—such as a liner size, volume of mud circulated, pressure losses and bit nozzle size—is important to obtain all the potential advantages of large pumps. And the operators

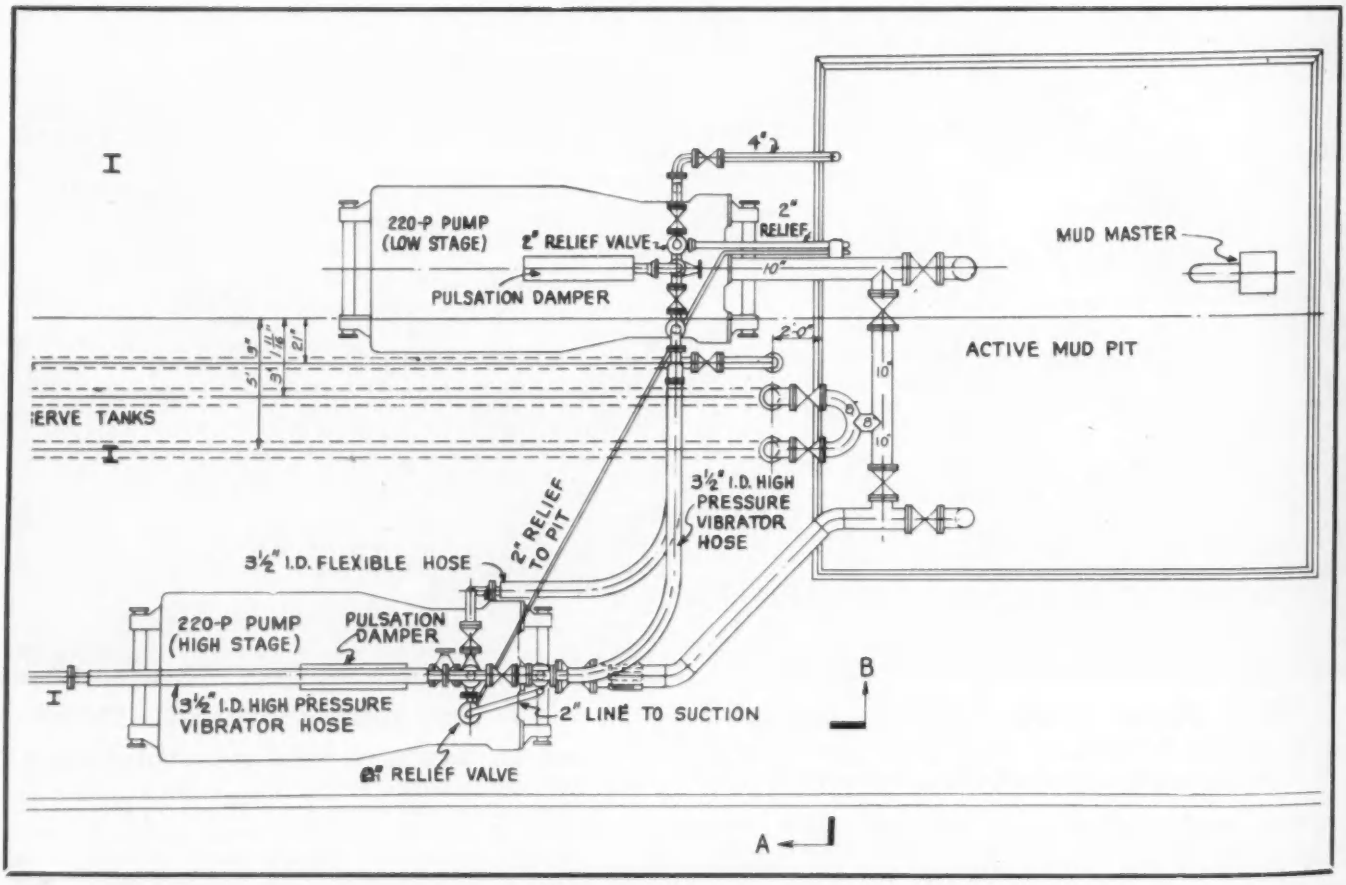


FIGURE 5.
Diagram of compounding system used by Humble Oil & Refining Company. Drawing shows where basic equipment is placed on barge.

bothering to make such studies will be rewarded by lower drilling costs.

Method of Compounding Mud Pumps. One of the most important developments of 1952 was the development of a successful method of compounding power pumps by Humble Oil & Refining Company. This was explained by Thomas Pennington, senior supervising engineer, Petroleum Engineering Division, Humble Oil & Refining Company, Houston: "The technique of compounding pumps is not new. It has been used on steam mud pumps for a number of years. There have been many attempts to effectively compound power pumps in the past. But few have met with complete success, for many require expensive, elaborate, bulky equipment. For this reason, the application has been slow in gaining widespread popularity. The compounding method achieves faster drilling rates and keeps engine and maintenance cost low."

"By the addition of three standard pieces of equipment—the automatic relief valve, vibrator hose and pulsation dampener—any pump may be synchronized to handle the compounding procedure. By the use of this equipment, the surges in the flow system may be eliminated. The dampeners take care of the ordinary surges while the larger ones, if they should build up, are handled by the relief valve. The vibrator hose helps to minimize mechanical vibration. The pump compound program is a result of engineering consideration and actual field trials." (See Figure 5.)

Rubber-on-Iron Plug Valve. A new rubber-on-iron plug valve (Figure 6) has come on the market in the past year. It works on the principle that the compression of the resilient rubber seats plus the pressure exerted on the valve forms a perfect seal. The valve is made in sizes from 2-inch through 4-inch and to test pressures of 6000 pounds. This plug valve requires no lubrication and closes easily against pressure. One man can close a four-inch valve against 1500 pounds of pressure with a 36-inch wrench. The valve can be redressed in the field without taking it out of the line.

A drilling company used one of these valves on the stand pipe on an

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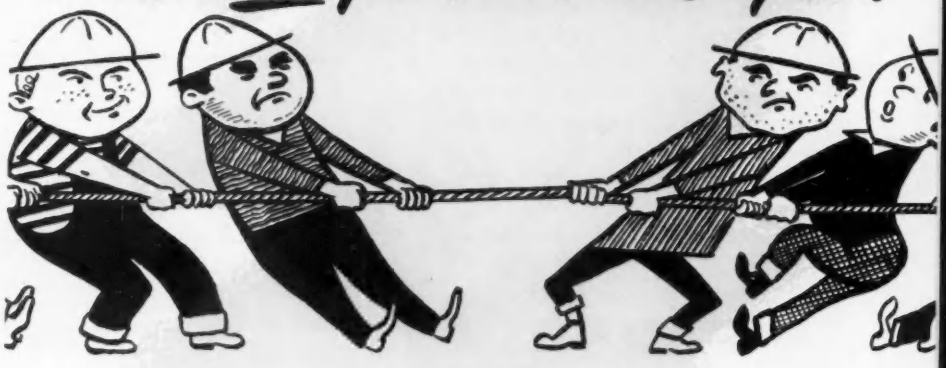
...will not pull the line apart



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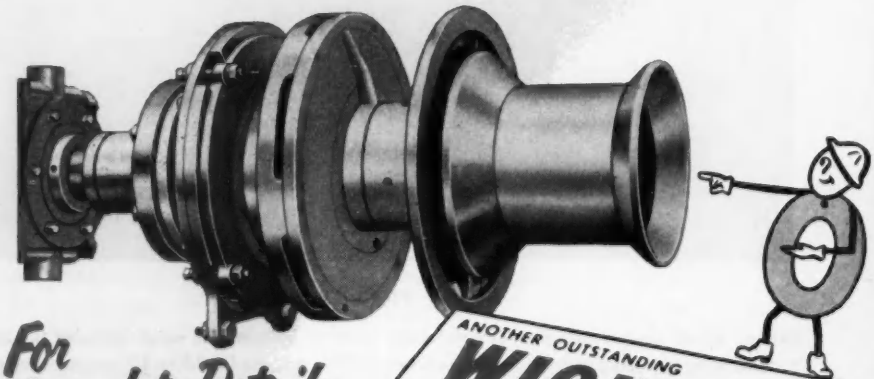

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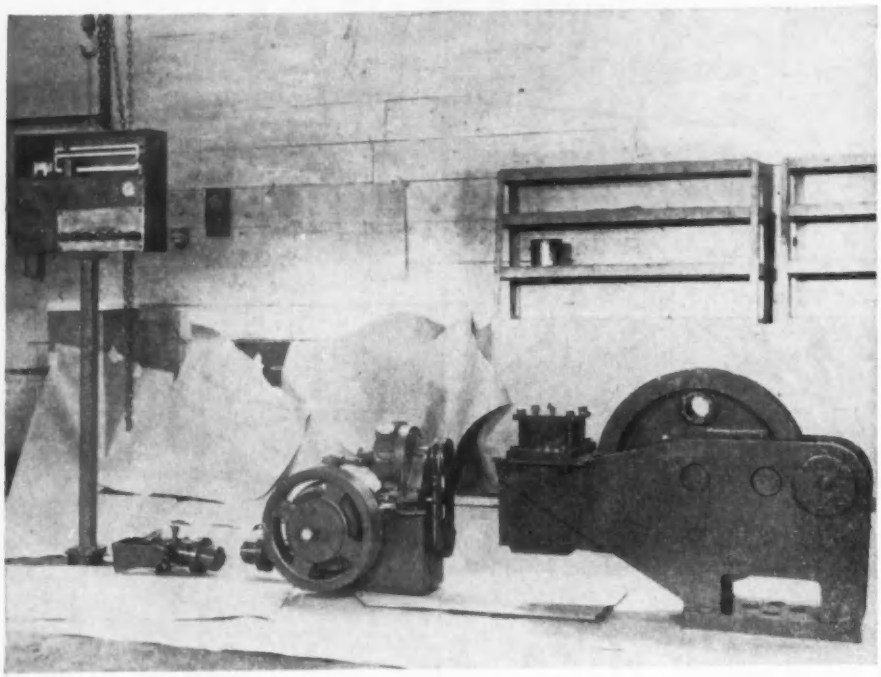


FIGURE 6.

Automatic feedoff control showing (left to right) control panel, reduction gear box with air motor drive and the dead line anchor. These controls received wide attention during 1952.

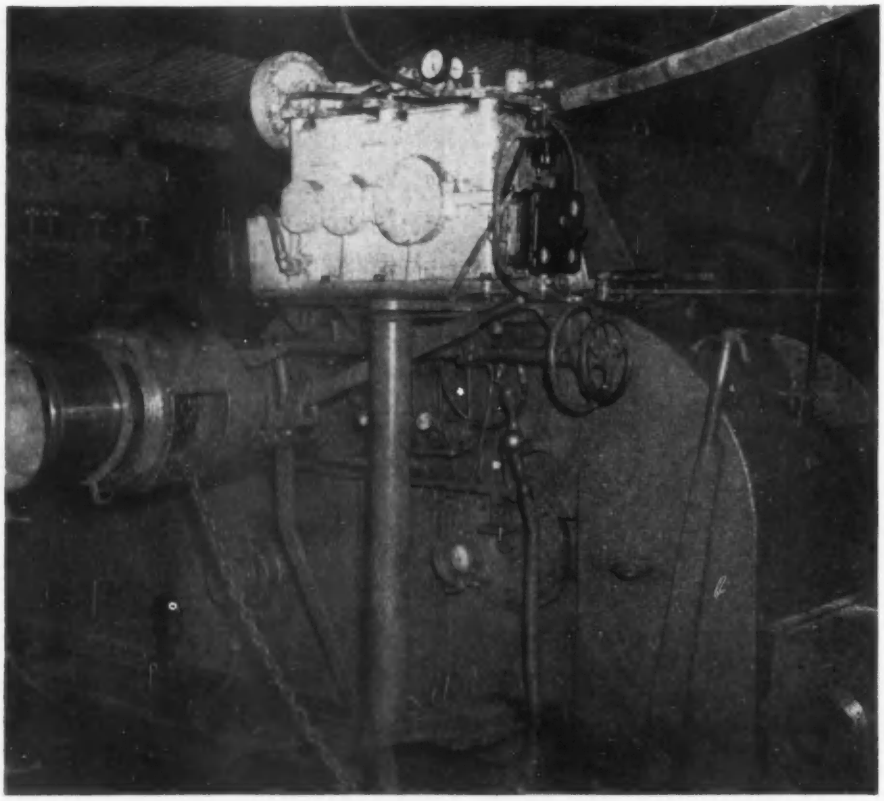


FIGURE 7.

Drilling weight control automatically maintains constant bottom hole weight offering the advantage of maximum operating efficiency with reduced drilling time and a 10 to 15 percent saving on b.ts. This can be applied to any size or any age rig.

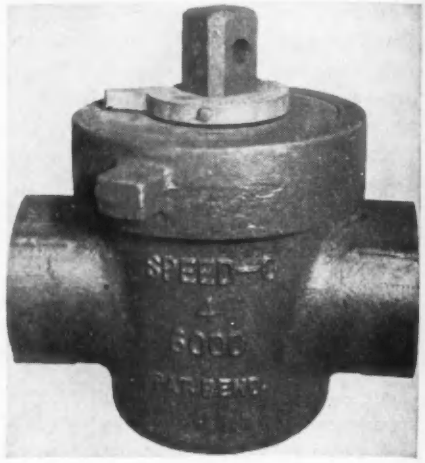


FIGURE 8.

Mud line plug valves are unlike conventional valves in that the higher the pressure, the harder the seats will adhere to the metal plug. Reasonable pressure will close valves.

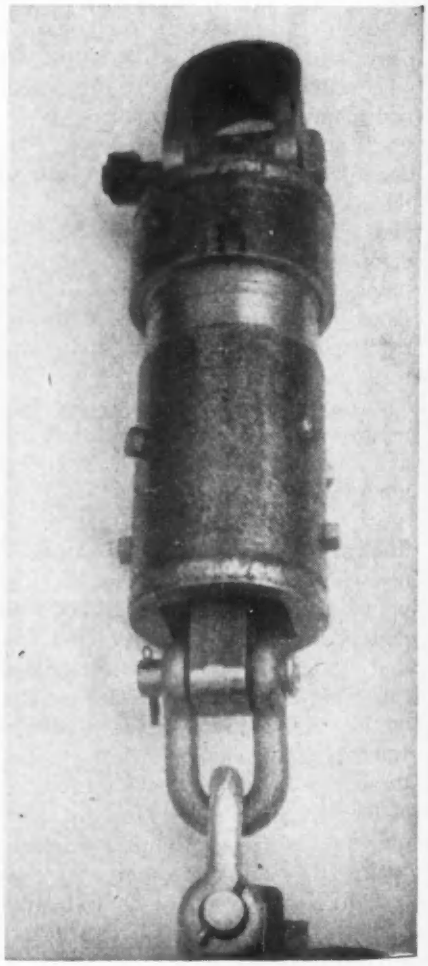


FIGURE 9.

Torque indicator tools have a tripping mechanism which is designed to tell the driller when adequate make-up has been applied.

experimental basis while drilling two wells — one to 13,500 feet and the second to 10,800 feet. The second well required 80 days to reach total depth while testing several different horizons for oil and gas. Practically the whole operation below seven-inch pipe, which was set at 9500 feet, was handled with 15 pounds mud. The valve never leaked and never failed to close or open with ease. Valves of any kind for mud service have always been a problem in the drilling industry and while there are many good valves made, this valve may be the answer for mud service.

Automatic Feedoff Controls. Automatic drilling controls are not new, but there are some new developments that are worthy of attention. These devices have gained in popularity among drilling contractors during the past year. This is possibly due to the more efficient operation of the modern machines, which have automatic controls. Or possibly it is due to the realization of the importance of a constant bit weight. The increased use of diamond type coring and drilling methods also has stressed the importance of a constant bit weight.

Most of the units now on the market use a diaphragm on the deadline or have a deadline anchor, which is connected to a hydraulic cylinder to actuate the machine. The impulse from this hydraulic system is metered, weighted or otherwise measured and governs the rate of feedoff of the drill pipe. Thus the drill pipe is lowered in the hole at a given rate and a constant predetermined weight maintained on the bit, and thereby a controlled rate of bit penetration. Most of the feedoff machines offered are connected to the drum by chains and clutches and actually back the drum down with the brakes released.

One of the newest machines in the field (Figures 7 and 8), accomplishes all of the above mentioned operations of feeding off through the rig's braking system. The advantages of this type machine are obvious in that bulky heavy duty machinery is not required due to taking advantage of the rig's braking system. This machine will feed off evenly and hold a constant bit weight regardless of the condition of the braking system, as long as it is capable of holding the load. This new machine has practically an unlimited range of feedoff rates or speeds. With this zero to unlimited feedoff rate, it is felt that feedoff devices will be more widely used as it is recognized that a controlled bit weight and rate of penetration is equally important in soft drilling formations as it is in hard formations. This new machine is small enough in physical size that it will be possible to make it an integral part of the drawworks and thus eliminate the moving of additional bulky equipment from well to well.

Nitrogen Impact Jar. There are several successful makes of fishing jars manufactured that have been available to the industry for some time. A new impact jar using gas expansion was developed last year.

This tool appears to offer several advantages:

- The jar strikes the fish while the fish is in tension.
- The jar does not require the use of drill collars.
- It has application to both cable tool and the rotary.
- It directs it's energy of impact immediately upon the fish; does not rattle the derrick.
- It can be operated on tubing, making it excellent for workover jobs.

Torque Indicator Tools. There has been a new development in torque tools for making up joints on drilling rigs (Figure 9). It has been found in routine inspection of drill collars that improper makeup is a fundamental cause of connection failures. The torque tool is designed to inform the driller when adequate torque has been applied to a drill collar connection during makeup.

One make consists of a spring-loaded toggle mechanism which will trip at a pre-set tensile load. This pre-set load may be adjusted at the time of installation for a given drill collar connection. In operation this tool is installed in the tong line, either in the makeup line or in the backup line. When the pre-set load is reached, the spring mechanism will trip, giving a noticeable interruption in line pull and making a noise similar to firing of a .22 caliber rifle. Further pull can be applied, but the proper makeup torque has been reached at the pre-set load. When the tension in the line is released, the torque device will recock itself and is then ready for the next makeup.

One service company provides torque wrench indicator service in the West Texas area on a rental service basis. The company installs these tools on the customers' rigs, instructs operating personnel in their use and makes monthly maintenance and calibration inspections. With the tremendous investment many companies and contractors have in drill collars particularly in hard rock areas, it has become necessary that they know the torque being applied in making up joints to prevent costly fishing and repair jobs.

Conclusion. Many companies consider that their overall costs for wildcat wells has increased out of proportion to field wells and to increased average depths of wells drilled each year over the past five to six years. This can be traced partially to the increased use of special tools for determining the content of the formations penetrated. Some of these special tools and services are:

Mud logging service trucks
Electric logging
Sidewall sampling
Diamond coring
Core analysis
Micro-logging
Dip meter surveys
On-location paleo sample checking
Directional surveys
Supplemental electric logging for correlation
One to several, company technicians for observation and calculation in connection with these special services

These special services all require extra rig time. That adds to the overall cost. It is surprising to figure the cost of these services separately for any given wildcat.

The drilling industry is successfully meeting the challenge of continued improvement. It must continue to strive for even greater efficiency in rig operation — through improved equipment and practices. At the same time, it must not overlook the less tangible but highly important field—closer relationship between all parts of the industry. Efficiency of operation and improved tools to attain the goals of the future are intertwined with cooperation of all phases of the industry.

How to do it!

DRILLING HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

Hanger Devised For Wire Spool

Setting a spool of wire line is a routine matter with a contractor in Eastern New Mexico because of a simple arrangement devised as part of the drilling equipment. First, four sockets are welded to the substructure of the rig, two on the bottom sills, and two on the vertical structural steel posts facing the pipe rack.

Two "A" frames with legs spaced to enter these sockets have ferrules welded at the apex where ends are joined. These ferrules are the next size larger pipe than the "axle" which is passed through the holes in the ends of the wire line spool. Then, the spool of wire line is placed in position near the derrick with the supporting pipe passed through both ferrules.

The derrick line is attached to the spool with a bridle and snatch block, to pull the loaded spool upward and back against the rig. The legs of the supporting device are guided into the sockets until they are bottomed. Matching holes through the top sockets, and two matching pair of legs supply means of locking the spool hanger in place permanently, or until the rig is torn down or a new line is required.

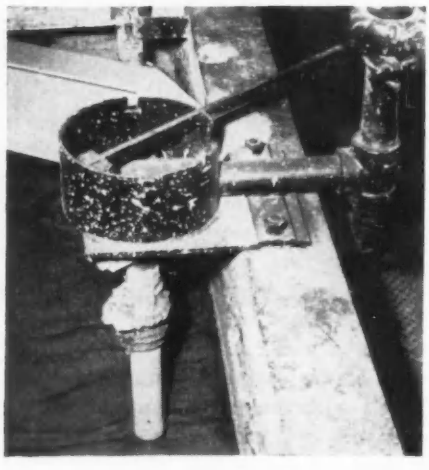
Sucker Rods Form Doghouse Steps

A Kansas operator has devised a practical solution to the problem of providing steps for the doghouse. Utilizing old sucker rods and pieces of scrap steel, the steps are welded in the fashion shown. The steps have hooked ends so as to fit into holes bored into the skid winching post or into the base of the doghouse. The base of the steps swings down against the ground as the upper end is hooked.

During moves the steps may be removed and carried inside the doghouse. Note the adjustable legs which greatly facilitate the leveling operations. By jacking up the doghouse to the proper height the leg extensions may be adjusted by pin connections in opposition to using rig timbers for blocks.

Mud Gun Can Be Directed Five Ways

A drilling barge operating in the Gulf is equipped with an interesting homemade device which is quite useful in a permanent mud system. On recently designed barges submersible type mud guns are used in conjunction with, or as an auxiliary to, impeller type mud agitators.



The photograph shows how the jet may be directed in any of five positions. The steel handle indicates the direction of the submersed jetting, and by changing the handle position to any of the five slots indicated, the submersed jet changes its direction of jetting. This provides an easy method of determining where the gun is controlled at the bottom of the tank, offering better agitation.

The "jet director" is made by cutting a four to five inch width of six-inch pipe which is welded on a flat one-quarter-inch steel plate. Slots are cut at 45 degree intervals around the circumference of the pipe, forming the locking mechanism when the handle is fitted into its recess.

Appropriate holes are bored in the plate to bolt the apparatus in place.

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Solid One-Piece Pin

Solid One-Piece Cutter Brace

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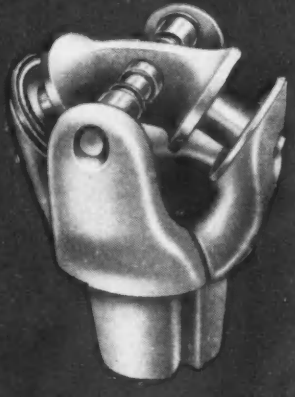

Makes a bit with all four legs solidly tied together

H. C. Smith bits also feature cutter teeth hardfaced with diamond metal, bodies heat-treated for maximum strength, precision cut tool-joint threads. These are some of the reasons why many operators prefer H. C. Smith bits for faster drilling with straight, full gauge hole.

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Carpet Sweeper Is Forge Blower

A cable tool contractor has fabricated a forge blower from a used carpet sweeper. The stream of air exhausted by the sweeper blower is sufficient to offer the required supply of air for the rig forge.

By preparing the sweeper motor, sans handle, on bricks at an elevation even with the front of the forge and by running a hose connection to the two-inch tee on the burner inlet the blower is assembled. All that is needed is to plug in the electric motor and the installation is complete.

Used on cable tool rigs where some tool dressing is a necessity, this blower offers a very unique approach to the blower problem. After the bit has been inserted in the blast as shown, the volume of oxygen required can be controlled by a rheostat on the switch.

This device will pay for itself in a few hours in areas where the price of gas is high and additional blast is necessary. By adding large amounts of oxygen to the fuel stream, a rapid increase in temperature can be obtained.

Wrist Pin Wrench Made of Steel Slab

When wrist pin nuts become loose on cable tool rigs the crank and wrist pin can soon be damaged beyond repair. A simple wrench which makes it easy to tighten wrist pins has been cut out from a slab of steel by a contractor in Pennsylvania.

The wrench can be cut from one-inch or two-inch steel plates. It is trimmed to a trapezoidal shape with a height of 18 to 24 inches. The hole is cut to the exact dimensions of the nut, through the wide end of the trapezoid.

In operation, the wrench is placed over the nut with the weight of the wrench against the side that needs to be tightened or loosened. The driller or tool dresser assumes a convenient position on the sampson post and drives the nut off or on, as the case may be.

One precaution necessary with this tool is to make sure that the tool dresser knows when the nut is tight. A few extra blows after the nut is drawn up may twist off the wrist pin.

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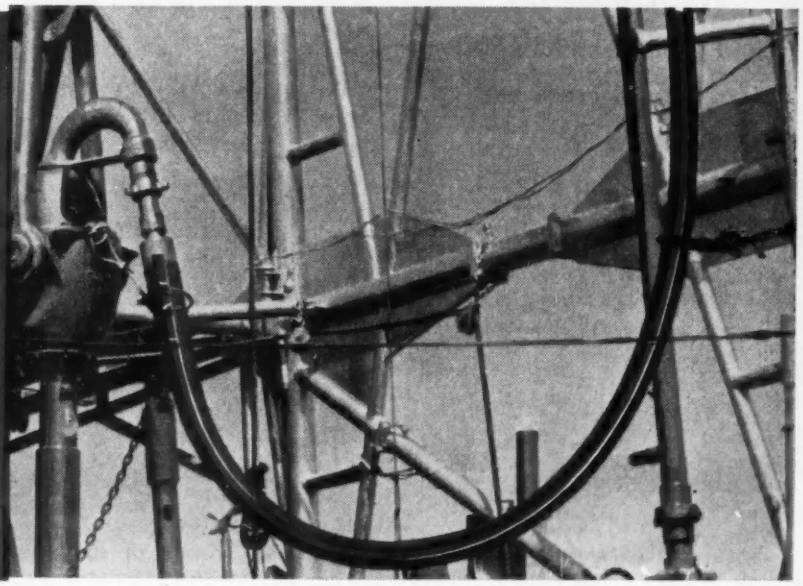

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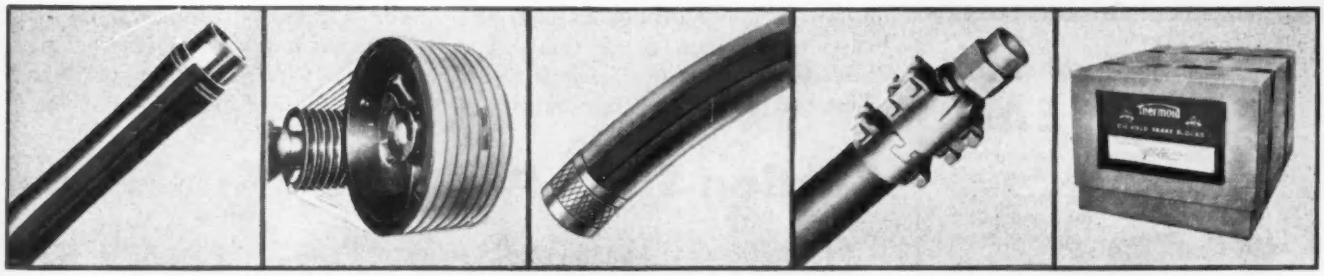

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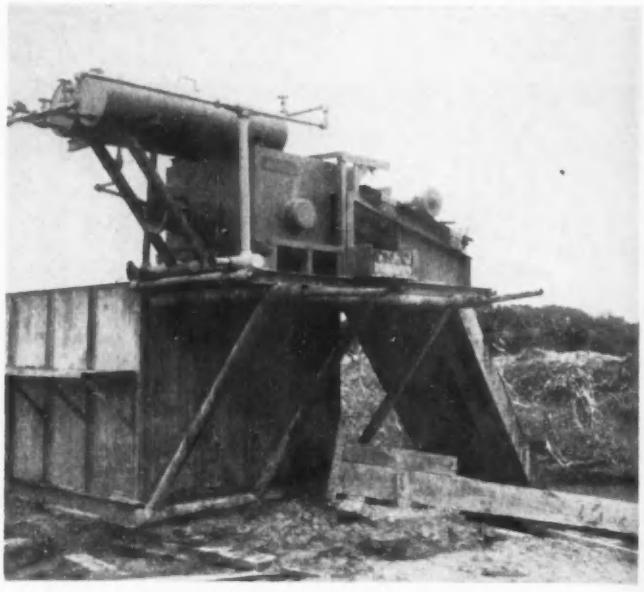


A simple hook-up for mounting the shale shaker and vessels which add chemicals to the drilling mud, was recently designed by a Gulf Coast contractor for a rig working in Brazoria County, Texas.

The photograph shows the tank disconnected ready for moving. The shaker rests on a framework made from four-inch pipe. Three four-inch braces support the load and are welded to the bottom of the mud tank. Two inch nipples are placed inside the four-inch horizontal pieces and extend a length suitable for a board to be laid across to form a catwalk when the location is rigged up.

Another set of braces is welded to the base of the shale shaker. These braces support two six-foot lengths of 12-inch pipe which are used to hold mud treating chemicals such as caustic and quebracho.

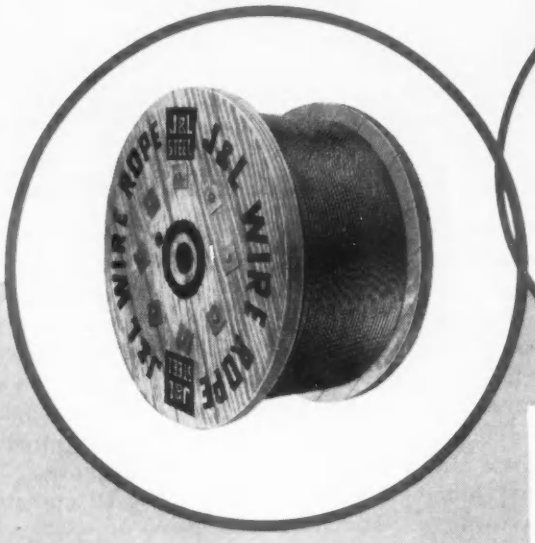
The line at the base of the shaker is provided with fittings to make the water and steam connections. The purpose is to dilute and stir the chemicals before they are added to the mud stream. The line has a blank in the middle with quick acting unions on each corner designed so that the steam connection is on the right and water on the left. The lines are reduced to ¾-inch and connections are made to both the top and bottom of the drums, offering thorough agitation.

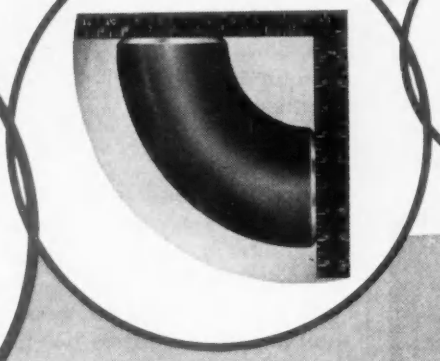
The picture reveals another interesting innovation, that being, the mud man's walk which is welded to the side of the mud tank proper. This offers a ramp or vantage point from which the mud can be checked periodically. It would be particularly useful in work-over jobs.

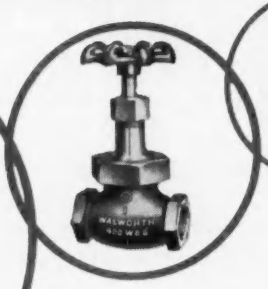
Suction Tank Provided With Flume

Returns from the hole can be directed through the shakers to the suction tank by building a flume which sets against the tank and carries wier aprons to discharge the mud. Half-collars welded to the side of the tank receive pipe nipples running at right angles to the tank and lying horizontal. The opposite ends are attached to vertical legs setting in larger pipe, both of which are equipped with matching holes to receive pins when leveling up the setting. A variation of the vertical supports is the use of screw jack heads so that leveling can be done to a finer point.

GOOD EQUIPMENT







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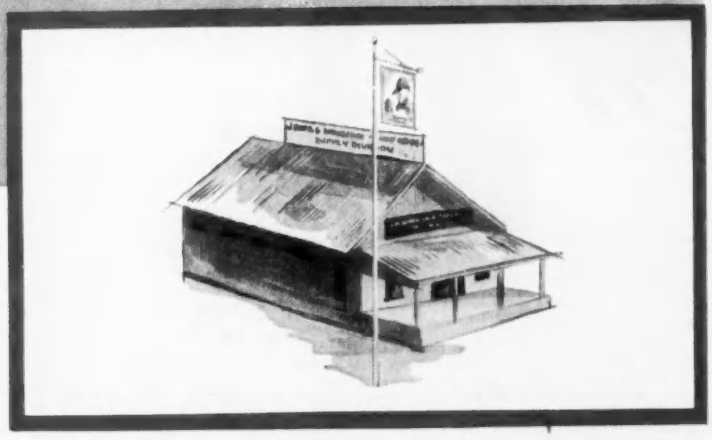

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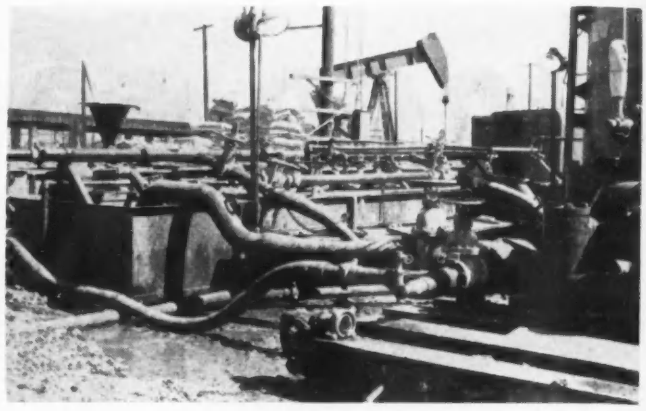
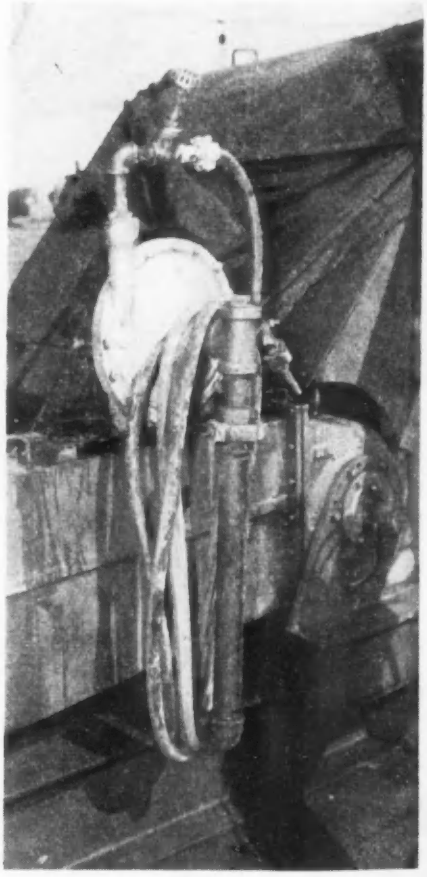
Over the Rim Suction Piping Is New



To compensate for misalignment between mud pumps and suction tank, and to eliminate pipe flanges in the vessel, 'over the rim' suction piping has been developed. This type piping cuts down damage to equipment from vibration and pump movement. In addition, rigging-up is facilitated because these 'U' shaped pipe sections are easily lowered into the tank with the aid of a truck boom and winch. The winch is equipped with a bridle attached to large substantial bails welded to two points on the piping. The rubber suction hose commonly used with mud pumps is permanently attached to these pipe bends, and connected to the pump suction port with the customary flanged fittings. The inverted 'U' shaped piping is attached to the flexible hose to create suction for the mud pumps. The photo shows piping fitted with bails by which it is easily lifted when rigging-up or tearing down.

The throat of these 'U' shaped suction pipe sections is wide enough to allow more than one foot for misalignment of connected equipment. This feature hastens rigging-up operations as extreme care is not necessary when making the suction pipe connections.

Washdown Pump Run Off Flywheel



There are many elaborate ways to connect up a washdown pump but the simplest scheme is to place the pump on the engine compounding unit housing and run the pump off a gear on the flywheel of the engine.

The pump is placed on a stand constructed so as to allow the pump to slide back and forth on the stand to adjust the belt tightness. After the pump is installed on this stand it is connected to a power take-off pulley furnished by the engine manufacturer.

The inlet on the side of the pump is connected to the fresh water supply and the outlet bushed down. A valve and nipple are installed with a washdown hose added. Once this installation is made, no further attention is needed.

When the water pressure is called for on the derrick floor or elsewhere, the valve is opened and the hose used. As soon as the hose is not needed, the valve is closed against the centrifugal pump. Centrifugal pump pressure is increased to approximately 30 psi., but no damage is incurred by the pump and the added drag on the engine is not noticeable. If the pump is to be out of service for a long period, the belt is thrown off.

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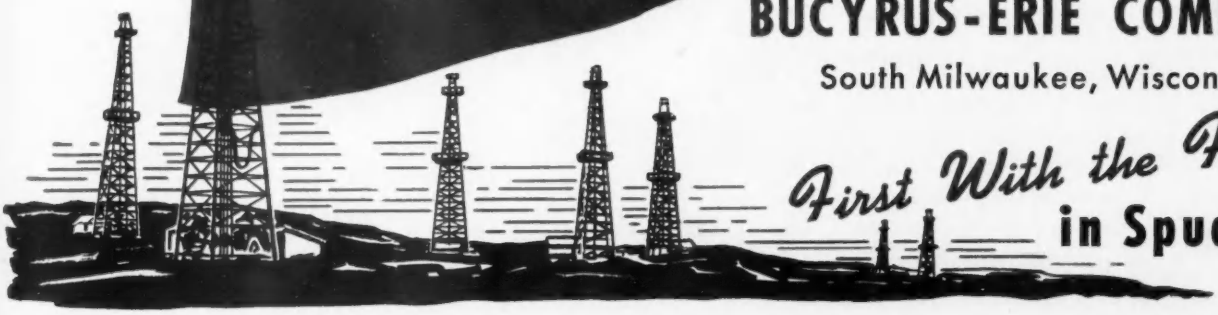

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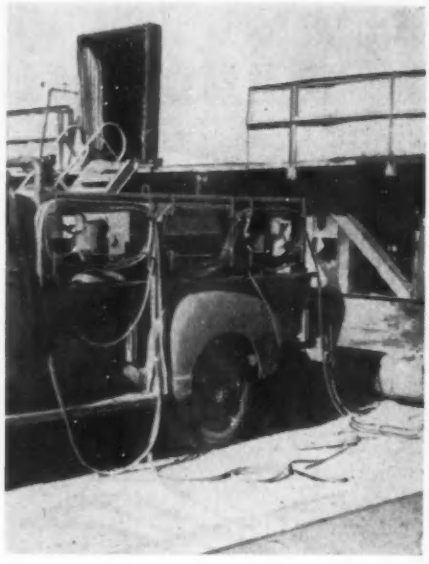
Bail Facilitates Tool Box Handling

Loading and unloading the heavily-loaded tool box can be simplified to a great extent by a sturdy bail which will permit easy, direct lifting by a boom-equipped winch truck.

A drilling contractor operating in the San Juan Basin area equips his tool boxes with a bail that not only is sturdy, but is so designed that it can be swung back to the back of the box where it will not affect the normal raising of the tool box lid.

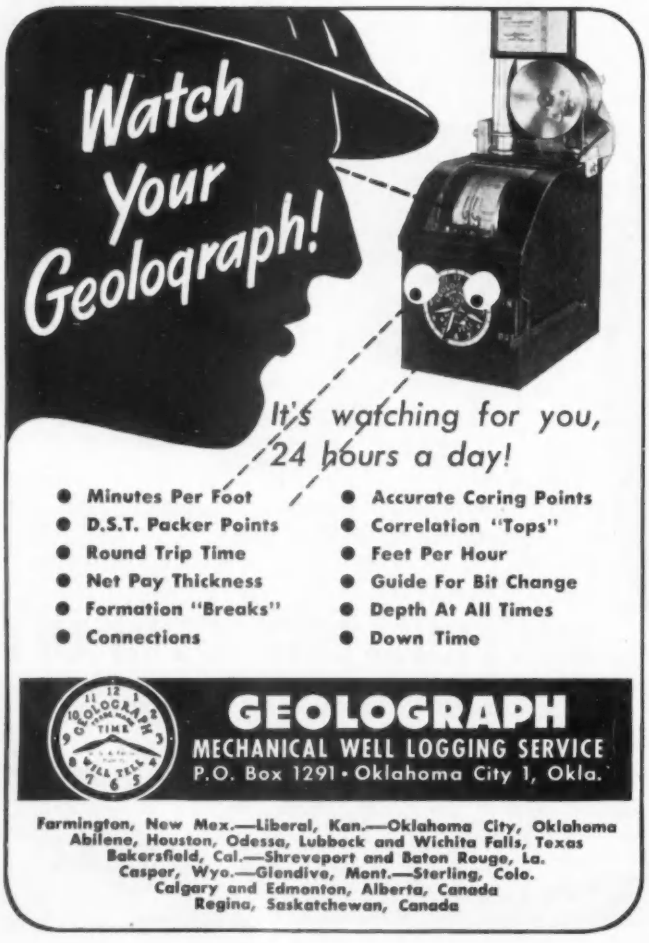
The side brackets of the bail are torch-cut of half-inch steel plate and further reinforced with angle iron welded along their lengths. The horizontal member spanning the length of the box is made up of two-inch pipe welded together to form a truss section which will not bend when the fully-loaded unit is picked up by the winch line.

Of interest in the construction of the box is the unusually strong piano-type hinge which runs the full length of the cover and which is not easily damaged by rough handling.



Truck Rack Holds Arc Welding Cable

Storage of arc welding cable and acetylene hose used by a drilling rig maintenance unit, is done in a manner which not only protects the equipment, but places the cable in a position where it can be removed easily. A pipe rack is attached to one side of a pick-up truck against the outside rail, so the welding cable can be conveniently stored with a minimum amount of effort. Posts at each end, and two intermediate standards furnish a base for cable storage hooks; one set for each of the three lines. The cables are looped loosely around the hanged hooks to eliminate damage,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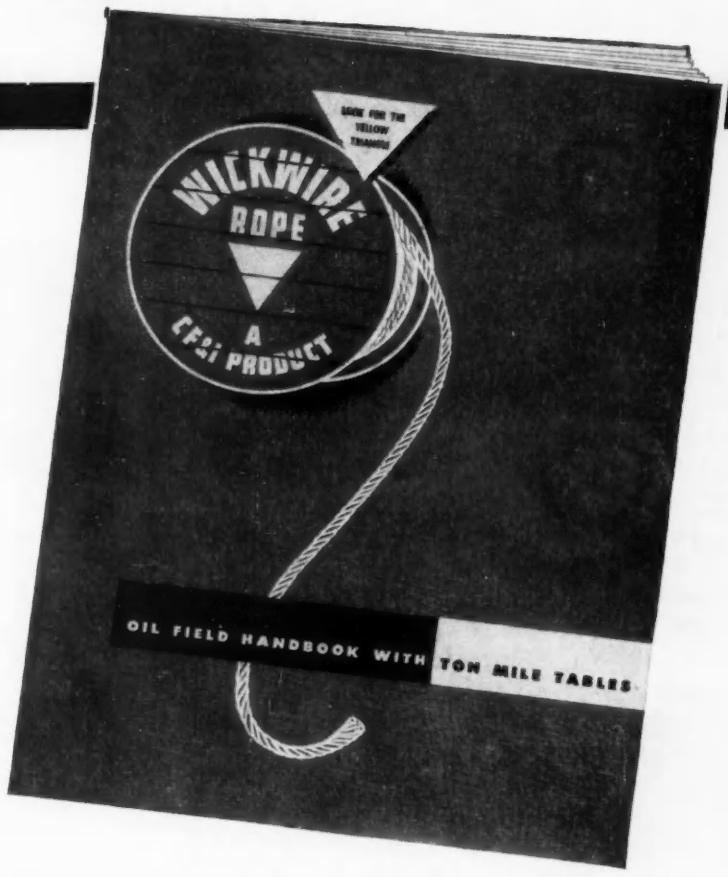

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and the loops so that only the length of wire necessary for the job at hand need be unreeled from the supporting hooks. This makes for good housekeeping.

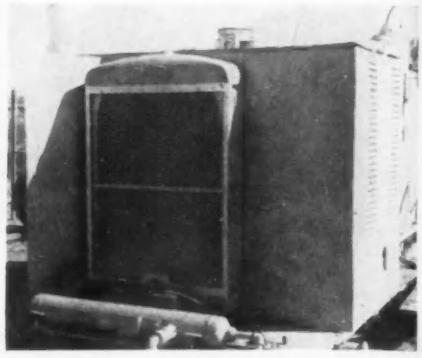
The pipe rack offers a convenient carry in which short lengths of small diameter pipe may be safely hauled from location to location, when the occasion arises.

A welding rod receptacle made of a short length of 4-inch pipe has been welded to the inside of the pipe rack, easily accessible to the welder.

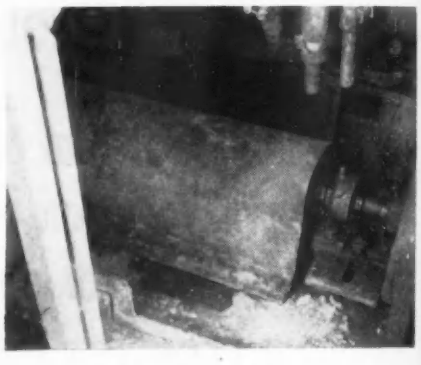
Since welding plays an important part in rig maintenance much advantage can be seen in this arrangement.

Housed Radiator Is Side-Mounted

In order to decrease the overall width of the building housing, the gas engine and hoist used for measuring the hole and running picture equipment, the original radiator was changed from a position in front of the engine to a place beside the power unit.



A steel building was constructed to house the machinery which is mounted on a unitized base. The fan drive for the radiator takes off from the fan pulley at the crankshaft end of the engine and leads to a jack shaft mounted on pillow block bearing on the floor. At the opposite end of this shaft, the conventional fan drive belt is attached so as to permit the radiator to face outward for adequate cooling of the circulated jacket water.



Much advantage of this method can be seen when space and adequate cooling facilities are not available.

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Artificial Lift

Equipment for 21,342 Wells Is Forecast

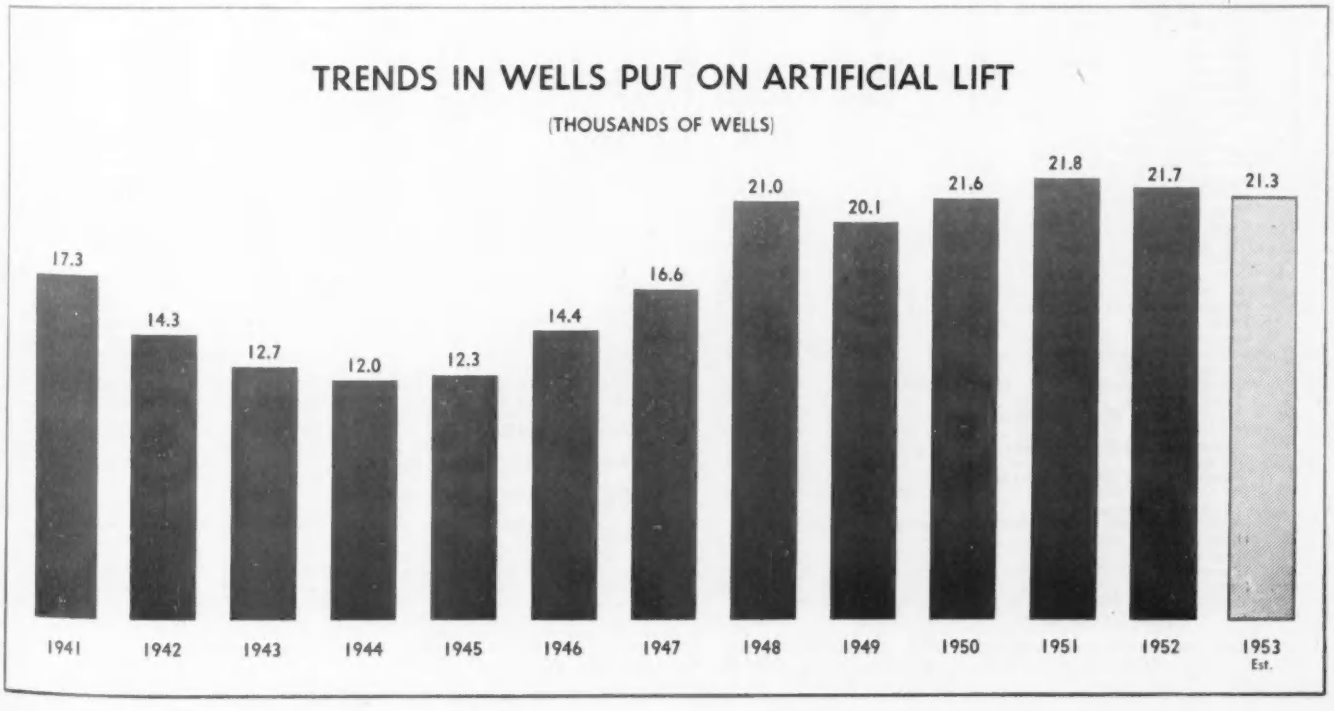
By J. E. KASTROP, WORLD OIL Staff

A NET GAIN of 21,342 is anticipated for 1953 in U. S. oil-producing wells to require some form of artificial lifting. This amounts to just 338 wells less than were placed on artificial lift in 1952, during which time 21,680 wells went on artificial lift, including beam pumping with sucker rods and down-the-hole pumps, hydraulic-type pumping units, gas lift, power oil pumps, and all other electrical and mechanical methods of lifting oil from subsurface levels.

Two factors materially influence the number of wells to go on artificial lift: new producing oil wells to be completed, and abandonments. New oil well completions are directly proportional to the exploratory effort; that is, the number of wells to be drilled. For this year the drilling forecast is for 46,988 wells, 1103 more than were drilled in the past year.

Although drilling was high in 1952, the steel strike had a profound influence. While there was not as much steel available for casing and tubing as there was demand, there appeared to be a heavy inventory of casing and tubing at the outset of the strike. Result was that most operators were conservative with their drilling programs; that is, wells were drilled where the chances were fairly good for an oil producer. This accounts for the relatively high number of wells placed on artificial lift. In 1953, the total number of wells expected to go on the pump is slightly less, although a few more wells will be drilled. If the steel situation continues favorable, ample tubular goods should be available to drill the anticipated number of wells. However, under these conditions, it is likely that greater stepouts in wildcatting will be made, with possibly more dry holes being drilled.

Abandonments and wells shut in during 1952 totaled 10,998, or 538 more than the 1951 figure. Without an increase in crude oil price, it was necessary in many cases to abandon wells or temporarily shut them in. This factor had some influence on the number of wells put on artificial lift in 1952, for it decreased the total wells on artificial lift at the end of the past year. Forecast for 1952 was for 22,441 wells, which was 690 wells high. Some areas showed a net result of no abandonments or shutin wells, or a very low number. These were Arkansas, Illinois, South Louisiana, Mississippi, Nebraska, the Texas Panhandle and Utah. This means that the increase in oil-producing wells for these states was greater than the total oil well completions during the year, indicating that some previously shutin wells were again



opened up and made productive. Secondary recovery programs, which are increasing in number, have had and will continue to have a considerable influence on the change in status of shutin wells and artificially lifted wells. In some cases, shutin wells were again made productive, and artificially lifted wells made into flowing wells. There will always be wells that are drilled as producers and shut in, due to lack of markets or, in the case of virgin territory, to absence of transportation facilities. Such was the case in some areas in North Dakota, Colorado, and some of the Rocky Mountain States. However, this condition is only temporary until volume produced warrants pipe lines.

Because of the change in status of flowing wells into the artificial lift column, some states show a net effect of having all new oil wells going into the artificial lift category. This was true in Illinois, Kentucky, Michigan, New York, Ohio, Oklahoma, Pennsylvania, Central Texas, East and North East Texas, Texas Panhandle and West Virginia.

Of all the wells put on artificial lift in 1952, more than 74 percent were located in the five major oil-producing states of California, Kansas, Louisiana, Oklahoma and Texas. With one exception, these states will show an increase in number of wells to go on artificial lift in 1953 compared with last year. Texas, where 7995 wells went on artificial lift in 1952, will see 7363 wells require some form of lifting in 1953. California will put about 1942 wells on artificial lift; Kansas will show 2058 wells to require lifting; Louisiana will have 1050 in the same category; and Oklahoma is expected to have 3200 wells go on artificial lift during 1953.

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Maintenance Costs

Because of the increase in number of artificial lift wells to be maintained during the coming year, expenditures for pump parts, rods, surface equipment repairs, other types of lifting equipment parts, materials, etc., not including labor or overhead, will reach an all time high. About $54,224,298 will be spent during the year to keep these artificial lift wells operating. Last year's expenditure for maintenance was $52,056,662. This increase is due primarily to the increase in number of wells to be maintained during the year. In estimating the total maintenance cost, only half of the anticipated wells to go on artificial lift are added to the total artificial lift wells at the beginning of the year. This gives an average for the entire period. Because of price control in many areas and on a variety of maintenance items, the cost per well did not advance materially in 1952.

Estimate of 1953 Artificial Lifting Equipment Needs

(Includes requirements for all types of pumping units and also air/gas lift units)

STATE or DISTRICT	Estimated Number Wells To Go On Artificial Lift During 1953	Wells Put On Pump or Lift in 1952	New Oil Wells Completed in 1952	Number of Flowing Wells End of 1952	Number of Wells On Artificial Lift End of 1952	Number of Net Wells Abandoned or Shut-In During 1952	Estimated Maintenance Cost (Equipment Only) For all Art. Lift Wells in 1953
Alabama	20	24	28	4	92	7	$ 8,970
Arkansas	181	249	203	350	3,578	0	19,910
California	1,942	1,904	1,836	1,866	29,005	555	11,990,400
Colorado	236	208	158	85	886	22	42,568
Illinois	789	854	809	7	33,727	0	3,275,616
Indiana	506	474	478	22	4,473	223	415,888
Kansas	2,058	1,952	1,965	58	32,018	1,149	3,635,170
Kentucky	548	549	533	.....	15,806	267	1,565,984
Louisiana	1,050	1,034	1,187	3,591	8,770	370	1,173,925
North Louisiana	656	673	677	424	6,867	370	827,425
South Louisiana	394	361	510	3,167	1,903	0	346,500
Michigan	268	279	258	134	3,858	151	483,032
Mississippi	19	38	95	206	1,504	0	266,464
Montana	197	139	147	30	3,286	41	467,130
Nebraska	96	97	87	32	278	0	50,530
New Mexico	479	373	537	3,462	3,141	0	957,000
New York	731	661	661	.....	23,300	461	1,183,300
Ohio	456	423	413	40	18,460	413	1,027,840
Oklahoma	3,215	3,200	3,082	1,485	58,762	1,153	6,640,700
Pennsylvania	679	675	675	.....	81,200	675	3,669,300
Texas	7,363	7,995	9,608	45,656	90,366	3,922	15,905,614
Dist. 1: South Central	361	328	329	246	3,883	167	560,832
Dist. 2: Middle Gulf	226	222	286	3,251	1,505	114	258,880
Dist. 3: Upper Gulf	800	787	874	5,142	5,762	463	850,356
Dist. 4: Lower Gulf- S.W.	465	463	748	5,122	6,110	307	976,822
Dist. 5 & 6: East Central and Northeast	566	596	360	13,285	13,392	651	2,735,000
Dist. 7-B and 9: North Central and North	2,445	2,467	2,887	3,276	30,292	1,262	5,546,640
Dist. 7-C & 8: West Central and West	2,178	2,894	3,903	15,301	21,467	958	3,857,076
Dist. 10: Panhandle	322	238	221	33	7,955	.....	1,120,008
Utah	19	14	20	10	51	1	6,710
West Virginia	70	69	69	.....	14,200	469	754,455
Wyoming	390	441	370	242	4,614	1,119	663,642
Other States[1]	30	28	70	69	158	.....	16,150
Total United States	21,342	21,680	23,289	57,349	431,533	10,998	$54,224,298

[1] Other states include: Florida, Missouri, North Dakota, Tennessee and Virginia.

U.S. Crude Production

May Reach 2310 Million Barrels

U. S. CRUDE production during 1952 set another new record, and prospects indicate that even this high mark will be excelled in 1953.

This year's output is likely to reach 2310 million barrels. If expectations are realized, the daily average yield in 1952 of 6,267,800 barrels will be increased to 6,328,800 barrels—a rise of 61,000 barrels daily, or 0.97 percent. Indicating the rapid strides being made in the U. S. producing rate, a gain of 53.4 percent in 1953 from the 1943 figure is forecast. In 1943 the U. S. produced 1,505,613,000 barrels, a mark which was erected on a daily average output of 4,124,900 barrels.

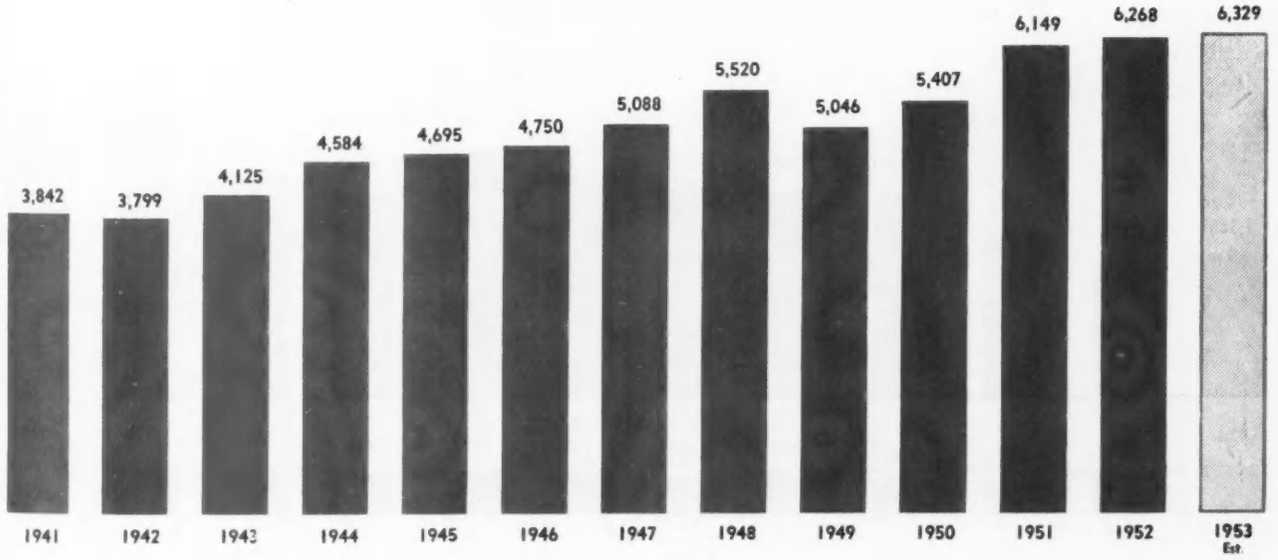
The significance of these figures lies in the paralleling growth in domestic requirements.

Fifteen of the 26 listed producing states yielded more crude during 1952 than the previous year. Again, the bulk of the increase came from the four leading producing states—Texas, California, Louisiana and Oklahoma. Texas, the nation's No. 1 crude producer, accounted for the bulk of the increase.

Production in Texas during 1952 averaged 2,815,200 barrels a day, an increase of 1.7 percent, or 47,700 barrels, from the daily average production of 2,767,500 barrels during the previous year. This rate of production accounted for 44.9 percent of all the crude produced in the U. S., down a fraction of a percent from the previous year. Texas has more than doubled its crude output during the past ten years, it having produced an aver-

UNITED STATES CRUDE OIL PRODUCTION

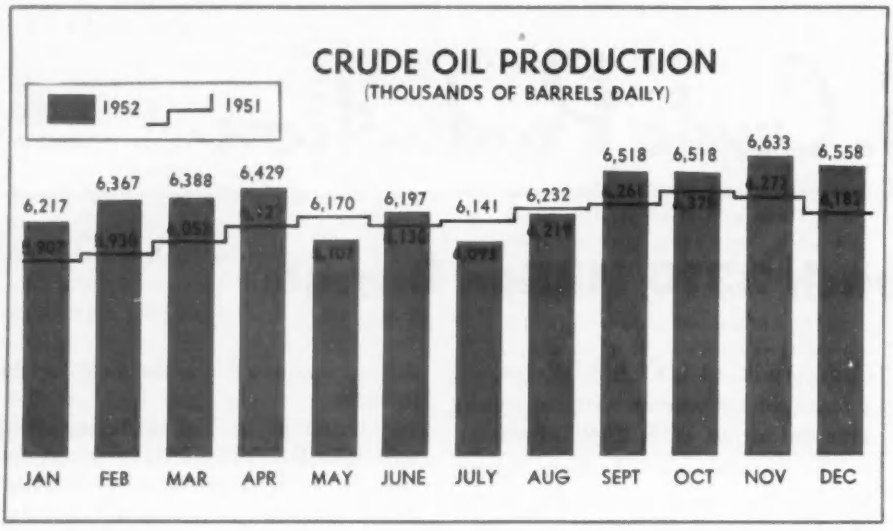
(THOUSANDS OF BARRELS DAILY)



(All Figures in Barrels)

YEAR	Yearly Total	Daily Average	YEAR	Yearly Total	Daily Average	YEAR	Yearly Total	Daily Average
1918	355,928,000	975,000	1930	898,011,000	2,460,000	1942	1,386,645,000	3,799,000
1919	378,367,000	1,037,000	1931	851,081,000	2,332,000	1943	1,505,613,000	4,124,900
1920	442,929,000	1,213,000	1932	785,159,000	2,151,000	1944	1,677,904,000	4,584,400
1921	472,183,000	1,294,000	1933	905,656,000	2,481,000	1945	1,713,655,000	4,694,900
1922	557,531,000	1,528,000	1934	908,065,000	2,488,000	1946	1,733,939,000	4,750,500
1923	732,407,000	2,007,000	1935	996,596,000	2,730,000	1947	1,856,987,000	5,087,600
1924	713,940,000	1,956,000	1936	1,099,687,000	3,013,000	1948	2,020,185,000	5,519,600
1925	763,743,000	2,092,000	1937	1,279,160,000	3,505,000	1949	1,841,940,000	5,046,400
1926	770,874,000	2,112,000	1938	1,214,355,000	3,327,000	1950	1,973,574,000	5,407,000
1927	901,129,000	2,469,000	1939	1,264,962,000	3,466,000	1951	2,244,529,000	6,149,400
1928	901,474,000	2,469,000	1940	1,353,214,000	3,707,000	1952	2,294,016,000	6,267,800
1929	1,007,323,000	2,760,000	1941	1,402,228,000	3,842,000	1953 Est.	2,310,000,000	6,328,800

Source: U. S. Bureau of Mines, except 1952, which has been calculated with aid of Bureau statistics for first 10 months and American Petroleum Institute weekly reports for last two months.



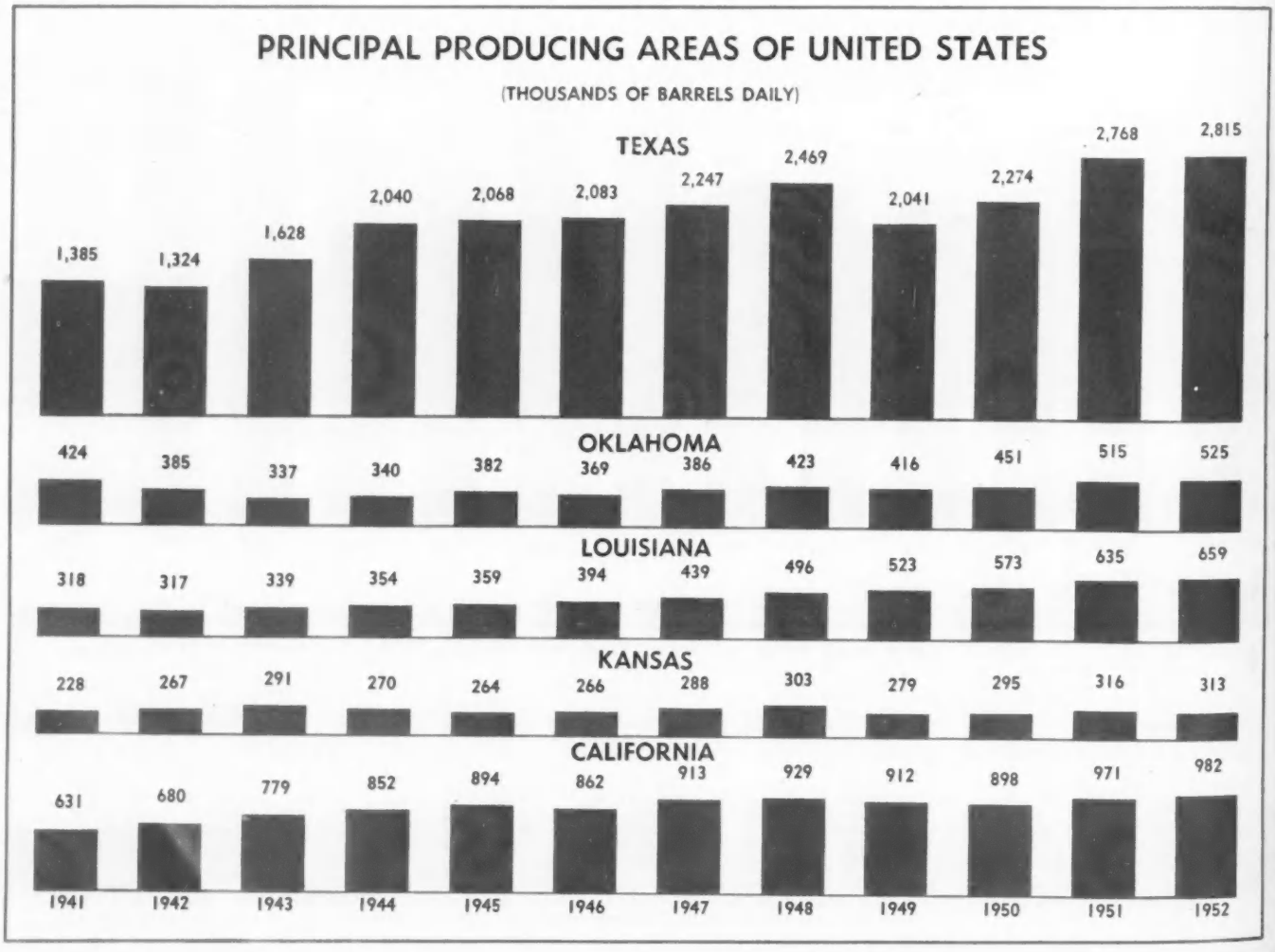
age of 1,323,553 barrels a day for all of 1942.

Continuing heavy demands for petroleum along the West Coast led California, the nation's No. 2 crude producer, into its second all-time peak in a row. The state yielded in 1952 a daily average of 981,800 barrels, representing a gain of 1.1 percent, or 10,700 barrels daily, over the previous year. It was in 1951 that California reversed a downward trend from the previous two years. And so California, by producing a total of 359,346,000 barrels for all of 1952, yielded slightly more than a third as much as Texas but held its No. 2 position by a daily average production of 118,258 barrels more than third place Louisiana. However, even with this crude yield, California produced only 15.67 percent of total U. S. yield, as compared with 15.8 the previous year and 16.6 percent in 1950.

Louisiana, likewise, increased its crude yield with a daily average production in 1952 of 658,700 barrels, up 23,500 barrels from the previous year —an increase of 3.7 percent. This producing rate was more than 50 percent greater than the state's figure for 1942. The major portion of Louisiana's recovery is from the Gulf Coast region, which produced last year a daily average of 543,100 barrels, up 5 percent from 1951. This rise more than offset a 2.2 percent decline in North Louisiana production—from a daily average rate of 118,100 barrels in 1951 to 115,600 barrels last year.

Fourth place Oklahoma recorded a daily average production in 1952 of 525,300 barrels, an increase of 2.1 percent, or 10,800 barrels, from the previous year's rate of 514,500 barrels. This increase in daily average output was reflected in Oklahoma's total annual production of 192,252,000 barrels as compared with 187,789,000 barrels for the previous year.

These four states were the only ones with a daily average production rate



exceeding ½ million barrels during 1952. Together, they accounted for 79.5 percent of the total U. S. production last year.

Seven Texas producing districts recorded increased production rates over the previous year, and four declined. The greatest increase in 1952 occurred in West Central Texas, where the daily average yield rose 42.6 percent, from 105,600 barrels in 1951 to 150,600 barrels last year. That increase was reflected in a total annual production hike from 38,530,000 barrels in 1951 to 55,109,000 barrels in 1952.

West Texas again led the state in production, yielding a daily average output of 948,000 barrels. This district's production was equivalent in 1952 to 15.07 percent of U. S. output. Again, California was the only state which produced more crude than the West Texas district.

A sizeable increase in daily average yield was recorded for the North Central Texas district—16.4 percent, which was equivalent to a rise from the 1951 figure of 82,800 barrels to 96,400 barrels a day. This resulted in an annual increase of 5,070,000 barrels to 35,291,000 barrels.

The greatest drop in production for any Texas district was the 6.1 percent decrease in the Panhandle—from a daily average rate of 87,100 barrels in 1951 to 81,800 barrels last year.

The second largest producing area in Texas, the Upper Gulf Coast, experienced a 3.2 percent drop in volume from the 1951 daily average rate of 494,200 barrels. Thus, annual production for the area slipped from 180,401,000 barrels in 1951 to 175,076,000 last year.

Despite a decrease of .8 percent in production, Kansas maintained its hold on the No. 5 position. This decline brought down 1951's daily average rate of 315,700 barrels to 313,200 barrels, resulting in an annual drop in production of 604,000 barrels.

Wyoming retained its sixth ranking spot, which it took over in 1951 from Illinois, by recovering 186,600 barrels daily. That was an increase of .1 percent from the previous year's annual rate of 186,100 barrels.

Illinois, the nation's No. 7 producer, checked its recent downward trend by increasing its recovery rate 1 percent in 1952. The state yielded an average of 161,100 barrels daily in comparison with 159,500 barrels marked up the previous year. Thus, Wyoming and Illinois were separated by 15,500 barrels a day last year.

The drive for the seventh ranking position among U. S. producers is growing to a climax. With a continuing rising production trend, New Mexico, No. 8 in 1952, experienced a 10.7 percent rise in its output. Its daily average rate was shoved up to 161,000 barrels, only 100 barrels a day shy of equalling Illinois' rate.

(See Table, Page 188)

U. S. Crude Production, by States and Districts, December and Years 1951 and 1952

From U. S. Bureau of Mines, except November and December, 1952, estimated from A.P.I. weekly reports, and breakdown of Louisiana and Texas by districts based on various sources.

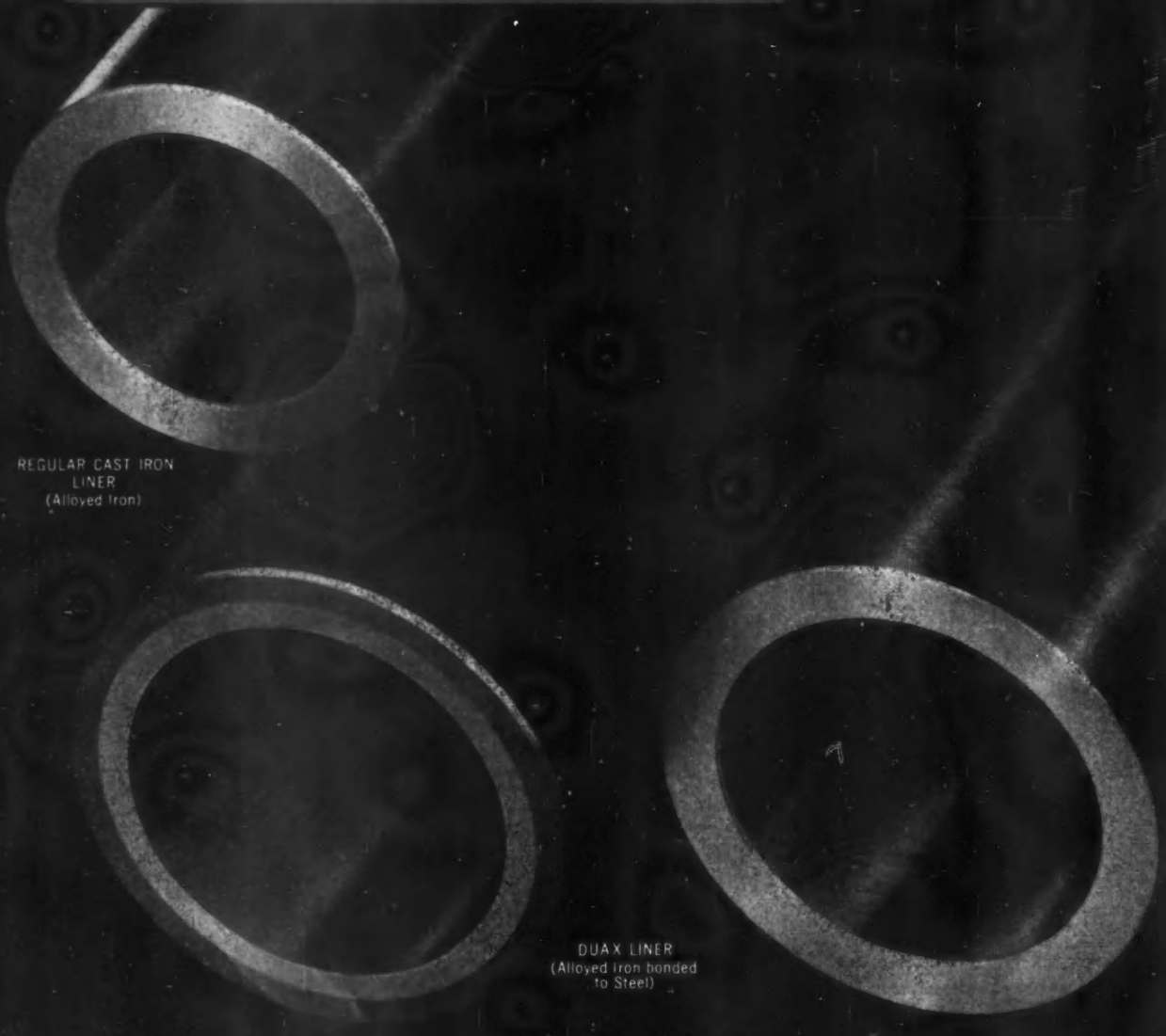
(THOUSANDS OF BARRELS)

STATE or DISTRICT	PRODUCTION IN DECEMBER: Monthly Total in December 1951	1952	% Diff. '51-'52	Daily Average for December 1951	1952	PRODUCTION DURING YEAR: Year Total 1951	1952	Daily Average for Year 1951	1952	% Diff. '51-'52	Year's Prod. in 1952 as Percent of U.S. Total	CUMULATIVE PRODUCTION TO END OF 1952: Thousands of Barrels	As Percent of U.S. Cumulative
Alabama	87	107	+ 23.0	2.8	3.5	1,020	972	2.8	2.7	— 3.6	0.04	4,655	0.01
Arkansas	2,506	2,384	— 4.9	80.8	76.9	29,770	29,229	81.6	79.9	— 2.1	1.27	855,101	1.88
California	30,302	30,705	+ 1.3	977.5	990.5	354,467	359,346	971.1	981.8	+ 1.1	15.67	9,333,411	20.53
Colorado	2,364	2,753	+ 16.5	76.2	88.8	27,225	29,436	74.6	80.4	+ 7.8	1.28	203,671	0.45
Florida	51	47	— 7.9	1.7	1.5	596	592	1.6	1.6	.....	0.02	2,768	.....
Illinois	4,663	5,283	+ 13.3	150.4	170.4	58,207	58,969	159.5	161.1	+ 1.0	2.58	1,623,492	3.57
Indiana	926	1,032	+ 11.4	29.9	33.3	10,597	12,045	29.0	32.9	+ 13.4	0.52	223,365	0.50
Kansas	9,728	9,607	— 1.3	313.8	309.9	115,218	114,614	315.7	313.2	— 0.8	5.00	2,329,355	5.12
Kentucky	1,046	958	— 8.4	33.8	30.9	11,622	12,070	31.8	33.0	+ 3.8	0.52	275,938	0.61
*Louisiana	19,790	21,253	+ 7.4	638.4	685.6	231,838	241,088	635.2	658.7	+ 3.7	10.51	3,033,942	6.67
North Louisiana	3,644	3,518	— 3.6	117.6	113.5	43,082	42,321	118.1	115.6	— 2.2	1.84	877,132	2.16
South Louisiana	16,146	17,735	+ 9.8	520.8	572.1	188,756	198,767	517.1	543.1	+ 5.0	8.67	1,829,886	4.51
Michigan	1,091	1,070	— 1.9	35.2	34.5	13,923	13,298	38.1	36.3	— 4.7	0.58	349,468	0.77
Mississippi	3,100	2,972	— 4.2	100.0	95.9	37,039	36,011	101.5	98.4	— 3.1	1.57	357,109	0.79
Missouri	1	1	.....	0.1	0.1	29	22	0.1	0.1	.....	.....	629	.....
Montana	714	927	+ 29.8	23.0	29.9	8,922	9,549	24.4	26.1	+ 6.9	0.42	186,722	0.41
Nebraska	171	277	+ 62.0	5.5	8.9	2,408	2,413	6.6	6.6	.....	0.10	12,205	0.02
New Mexico	4,678	5,382	+ 15.0	150.9	173.6	53,082	58,936	145.4	161.0	+ 10.7	2.57	794,413	1.75
New York	342	402	+ 17.5	11.0	13.0	4,254	4,382	11.7	12.0	+ 2.6	0.19	185,647	0.41
North Dakota	3	316	+10,433.3	0.1	10.2	22	1,503	0.1	4.1	+4,000.0	0.07	1,525	.....
Ohio	212	280	+ 32.1	6.8	9.0	3,097	3,222	8.5	8.8	+ 3.5	0.14	627,318	1.38
Oklahoma	16,273	16,674	+ 2.5	524.9	537.8	187,789	192,252	514.5	525.3	+ 2.1	8.38	6,641,505	14.61
Pennsylvania	769	870	+ 13.1	24.8	28.0	11,150	11,072	30.6	30.2	— 1.3	0.48	1,147,385	2.53
Tennessee	1	1	.....	0.1	0.1	14	9	.....	.....	.....	.....	527	.....
*Texas	86,943	93,203	+ 7.2	2,804.6	3,006.5	1,010,128	1,030,350	2,767.5	2,815.2	+ 1.7	44.92	15,763,337	34.68
Dist. 1: South Central	1,019	1,203	+ 18.1	32.9	38.8	12,171	12,595	33.3	34.4	+ 3.3	0.54	312,240	0.75
Dist. 2: Middle Gulf	5,155	5,404	+ 4.8	166.3	174.3	60,156	59,118	164.8	161.5	— 2.0	2.57	674,173	1.63
Dist. 3: Upper Gulf	15,063	15,793	+ 4.8	485.9	509.5	180,401	175,076	494.2	478.3	— 3.2	76.0	2,975,704	7.21
Dist. 4 L. Gulf-S.W.	7,944	8,463	+ 6.5	256.3	273.0	93,711	95,229	256.7	260.2	+ 1.4	4.14	1,114,155	2.70
Dist. 5: East Central	1,638	1,707	+ 4.2	52.8	55.1	19,190	19,906	52.6	54.4	+ 3.4	0.86	549,546	1.33
Dist. 6: Northeast	12,248	12,481	+ 1.9	395.1	402.6	142,706	142,987	391.0	390.7	— 0.1	6.22	2,732,093	6.62
Dist. 7-B: N. Central	2,614	3,658	+ 39.9	84.3	118.0	30,221	35,291	82.8	96.4	+ 16.4	1.54	551,595	1.34
Dist. 7-C: W. Central	3,816	5,440	+ 42.6	123.1	175.5	38,530	55,109	105.6	150.6	+ 42.6	2.39	347,788	0.84
Dist. 8: West	29,660	30,663	+ 3.4	956.8	989.1	343,645	346,969	941.5	948.0	+ 0.7	15.07	3,102,178	7.52
Dist. 9: North	4,900	5,889	+ 20.2	158.1	189.9	56,894	61,946	155.9	169.3	+ 8.6	2.69	1,233,031	2.96
Dist. 10: Panhandle	2,590	2,502	— 3.4	83.5	80.7	31,783	29,927	87.1	81.8	— 6.1	1.30	731,883	1.78
Utah	151	162	+ 7.3	4.9	5.2	1,425	1,736	3.9	4.7	+ 20.5	0.07	5,037	0.01
Virginia	1	3	+ 200.0	.....	0.1	12	15	.....	0.1	+ 25.0	0.01	218	.....
West Virginia	211	209	— 1.0	6.8	6.8	2,743	2,574	7.5	7.0	— 6.7	0.11	446,277	0.98
Wyoming	5,526	6,413	+ 16.1	178.3	206.9	67,932	68,311	186.1	186.6	+ 0.1	2.98	1,052,041	2.31
Unclassified	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	572	0.01
Total United States	191,650	203,291	+ 6.1	6,182.3	6,557.8	2,244,529	2,294,016	6,149.4	6,267.8	+ 1.9	100.0	45,457,633	100.0

* Data on Louisiana and Texas by districts are from various sources and do not agree with state totals, which are on Bureau of Mines basis.

NOTE CIRCUMFERENTIAL GRINDER MARKS ON THIS ENLARGED AXELSON LINER END-FACE SECTION.
(See main copy for explanation.)

AXELSON liners



REGULAR CAST IRON LINER
(Alloyed Iron)

DUAX LINER
(Alloyed Iron bonded to Steel)

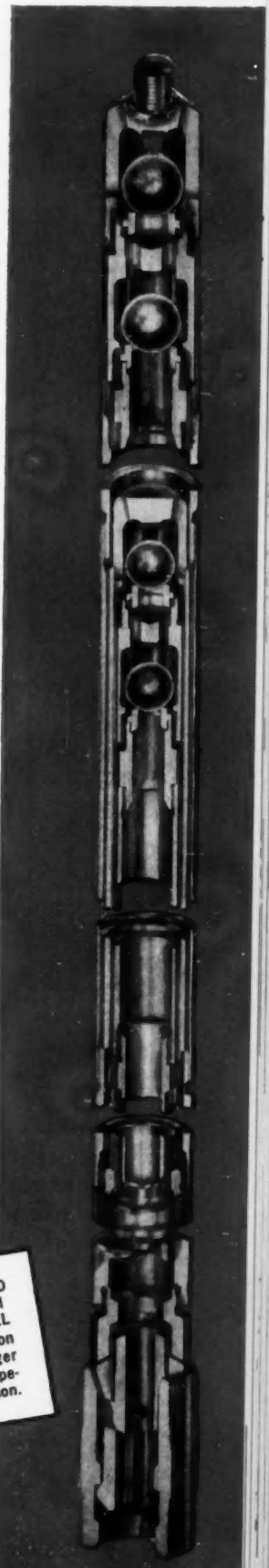
HARDENED CAST IRON LINER
(Alloyed Iron)

provide **POSITIVE** fluid seal against pressure

Axelson's circumferential grinding is a unique precision grinding operation which assures squareness of the end-faces to the bore and, at the same time, incorporates microscopic circumferential grinder marks in the end-faces. When liner end-faces are forced together at installation, these phonograph record-like grooves interlock to provide a lock against radial pressure leakage — a feature exclusive with Axelson.

Uniformity of liner bore is assured by Axelson, through their MICROFINISH honing operation which reduces wearing-surface irregularities to within a few millionths of an inch. Porosity of the casting is not a problem with Axelson because their liners are *centrifugally* cast. Thousands of tests have failed to turn up a single leak in a spun casting.

For complete information covering the three standard types of Axelson liners, write for bulletin, "Axelson Liners."



AXELSON "RLT" ROD LINER TYPE, WITH TRAVELING BARREL
There is an Axelson deep well plunger pump for every specific well condition.

AXELSON *Chosen first.... to last!*

PETROLEUM PUMPING EQUIPMENT

PSC

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

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United States Crude Oil Production, By States, By Years (Part 1)

Data in thousands of barrels; from *Mineral Resources and Minerals Yearbook*, except where otherwise indicated in footnotes.

Year	Alabama	Arkansas	California	Colorado	Florida	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Missouri	Montana	Nebraska	New Mexico
1875									[E]							
1876			12						[G] [E]							
1877			13						[G] [E]							
1878			15						[G] [E]							
1879			20						[G] [E]							
1880			40						[G] [E]							
1881			100						[G] [E]							
1882			129						[G] [E]							
1883			143						[G5]							
1884			262						[G4]							
1885			325						[G5]							
1886			377						[G5]							
1887			678	76					[G5]							
1888			690	298					[G5]							
1889			303	317		1	33	1	[G5]				[H]			
1890			307	369		1	64	1	[G6]				[H]			
1891			324	666		1	137	1	[G9]				[H]			
1892			385	824		1	698	5	[G7]				[H]			
1893			470	594		1	2,335	18	[G3]				[H]			
1894			706	516		[H]	3,689	40	[G2]				[H]			
1895			1,209	438		[H]	4,386	44	[G2]				[H]			
1896			1,253	361		[H]	4,681	114	[G2]				[H]			
1897			1,903	385		1	4,122	81	[G H]				[H]			
1898			2,257	444		[H]	3,731	72	[G6]				[H]			
1899			2,642	390		[H]	3,848	70	[G18]				[H]			
1900			4,325	317		[H]	4,874	75	[G62]		[J]		[J2]			
1901			8,787	461		[H]	5,757	179	[G137]		[J]		[J2]			
1902			13,984	397		[H]	7,481	332	[G185]	549	[J]		[J1]			
1903			24,382	484			9,186	932	[G554]	918	[J]		[J3]			
1904			29,649	501			11,339	4,251	[G998]	2,959	[J]		[J3]			
1905			33,428	376		181	10,964	[I]3,750	[G]1,217	8,910	[J]		[J3]			
1906			33,099	328		4,397	7,674	[I]3,627	[G]1,214	9,077	[J]		[J3]			
1907			39,748	332		24,282	5,128	2,410	[G]821	5,000	[J]		[J4]			
1908			44,855	380		33,686	3,283	1,801	728	5,789	[J]		[J15]			
1909			55,472	311		30,898	2,296	1,264	639	3,060	[J]		[J6]			
1910			73,011	240		33,143	2,160	1,128	469	6,841	[J]		[J4]			
1911			81,134	227		31,317	1,695	1,279	472	10,721	[J]		[J8]			
1912			87,269	206		28,602	970	1,593	484	9,263	[K]					
1913			97,788	189		23,894	956	2,375	525	12,499	[K]		[K]			[K]
1914			99,775	223		21,920	1,336	3,104	503	14,309	[K]		[K]			
1915			86,592	208		19,042	876	2,823	437	18,192	[K]		[K]			
1916			90,952	197		17,714	769	8,738	[L]1,202	15,248	[K]		[K]	45		
1917			93,878	121		15,777	760	36,536	[L]3,088	11,392	[K]			100		
1918			97,532	143		13,366	878	45,451	[L]4,368	16,043	[K]			69		
1919			101,183	121		11,960	972	33,048	9,278	17,188	[K]		[K]	90		[K]
1920		[K]	103,377	111		10,774	945	39,005	8,738	35,714			[K]	340		[K]
1921		10,473	112,600	108		10,043	1,158	36,456	9,013	27,103			[K]	1,509		[K]
1922		12,712	138,468	97		9,383	1,087	31,766	8,973	35,376			[K]	2,449		[K]
1923		36,610	262,876	86		8,707	1,043	28,250	8,069	24,919			[K]	2,782		[K]
1924		46,028	228,933	445		8,081	935	28,836	7,407	21,124				2,815		98
1925		77,398	232,492	1,226		7,863	829	38,357	6,759	20,272	4			4,091		1,060
1926		58,332	224,673	2,768		7,760	808	41,498	6,274	23,201	94			7,727		1,666
1917		40,005	231,196	2,831		6,994	852	41,069	6,719	22,818	439			5,058		1,226
1928		32,096	231,811	2,774		6,462	1,052	38,596	7,359	21,847	594			4,015		943
1929		24,917	292,534	2,358		6,319	981	42,813	7,775	20,554	4,528			3,980		1,830
1930		19,702	227,329	1,656		5,736	994	41,638	7,389	23,272	3,911			3,349		10,189
1931		14,791	188,830	1,545		5,039	840	37,018	6,456	21,804	3,789			2,830		15,227
1932		12,051	178,128	1,136		4,673	806	34,848	6,287	21,807	6,910		[K]	2,457		12,455
1933		11,686	172,010	919		4,244	737	41,976	4,608	25,168	7,942	[K]	[K]	2,273		14,116
1934		11,182	174,305	1,139		4,479	838	46,482	4,860	32,869	10,603	[K]	[K]	3,603		16,864
1935		11,008	207,832	1,560		4,322	777	54,843	5,258	50,330	15,776	[K]	[K]	4,603		20,483
1936		10,469	214,773	1,650		4,475	822	58,317	5,633	80,491	11,928		[K]	5,868		27,223
1937		11,764	238,521	1,605		7,499	844	70,761	5,484	90,924	16,628		[K]	5,805		38,854
1938		18,180	249,749	1,412		24,075	995	60,064	5,821	95,208	18,745		[K]	4,946		35,759
1939		21,238	224,354	1,404		94,912	1,711	60,703	5,621	93,646	23,462	107	40	5,960	2	37,637
1940		25,775	223,881	1,626		147,647	4,978	66,139	5,188	103,584	19,753	4,400	44	6,728	276	39,129
1941		26,327	230,263	2,150		132,393	7,411	83,242	4,762	115,908	16,359	15,327	47	7,526	1,898	39,569
1942		26,628	248,326	2,199		106,391	6,743	97,636	4,534	115,785	21,754	28,833	36	8,074	1,237	31,544
1943		27,600	284,188	2,320	4	82,260	5,283	106,178	7,883	123,592	20,768	18,807	36	7,916	635	38,896
1944	43	29,418	311,793	3,083	12	77,413	5,118	98,762	9,621	129,645	18,490	16,337	45	8,647	417	39,555
1945	181	28,613	326,482	5,036	30	75,094	4,868	96,415	10,325	131,051	17,267	19,062	45	8,420	305	37,351
1946	380	28,375	314,713	11,856	57	75,297	6,726	97,218	10,578	143,669	17,074	24,298	51	8,825	293	36,814
1947	396	29,948	333,132	15,702	259	66,459	6,095	105,132	9,397	160,128	16,215	34,925	55	8,742	229	40,926
1948	466	31,682	340,074	17,878	290	64,808	6,974	110,908	8,801	181,458	16,871	45,761	44	9,382	215	47,969
1949	462	29,986	332,942	23,587	441	64,501	9,696	101,868	8,803	190,826	16,517	37,966	49	9,118	330	47,645
1950	735	31,108	327,607	23,303	487	62,028	10,699	107,586	10,381	208,965	15,826	38,236	32	8,109	1,547	47,367
1951	1,020	29,770	354,467	27,225	596	58,207	10,597	115,218	11,622	231,838	13,923	37,039	29	8,922	2,408	53,082
1952[P]	972	29,229	359,346	29,436	592	58,969	12,045	114,614	12,070	241,088	13,298	36,011	22	9,549	2,413	58,936
Total	4,655	855,101	9,333,411	203,671	2,768	1,623,492	223,365	2,329,355	275,938	3,033,942	349,468	357,109	629	186,722	12,205	794,413

[A] Ut. prod. est. at 3,650 bbls. in 1939; 3,126 bbls. in 1940; and 189,726 bbls. cum. through 1940.

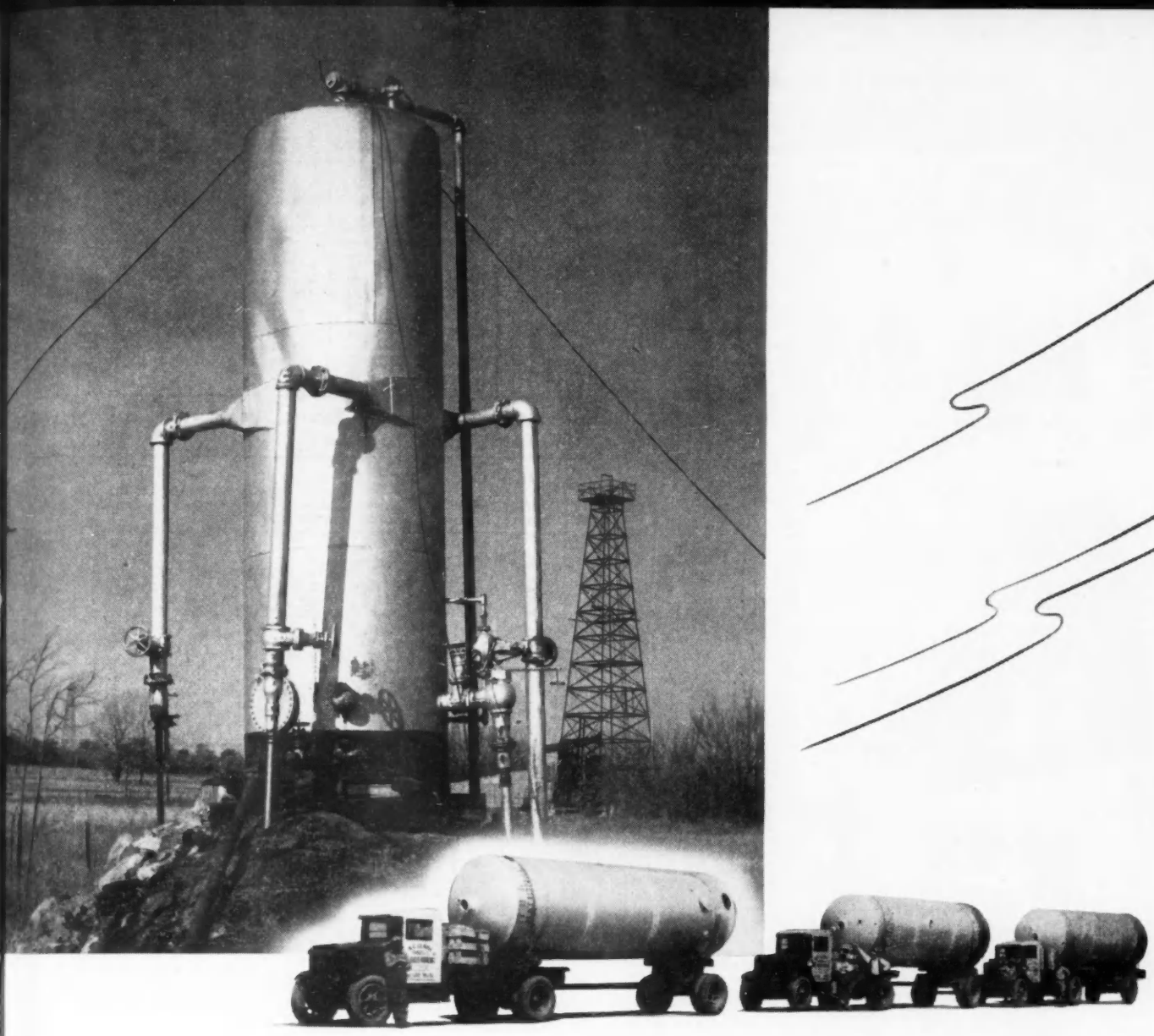
[B] *Petroleum in U. S. and Possessions*, by Arnold and Kemnitzer, shows for Alas. following data: 1904-1919, est., 56,000 bbls.; 1920, 11,000 bbls; 1921, 10,000 bbls.; 1922-1928, est., 73,000 bbls.; total, 1904-1928, 150,000 bbls.

[C] "Unclassified" includes 1912, Alas. and Mich.; 1913, Alas., Mich., Mo. and N. Mex.; 1914-16, Alas., Mich. and Mo.; 1917-18, Alas. and Mich.; 1919, Alas., Mich., Mo. and N. Mex.; 1920, Alas., Ark., Mo., N. Mex. and Ut.; 1921-23, Alas., Mo. and N. Mex.; 1924-31, Alas. and Ut.; 1932, Alas., Mo. and Ut.; 1933, Alas., Mis., Mo. and Ut.; 1934, Mis., Mo. and Ut.; 1935, Mis., Mo., Ten. and Ut.; 1936-1938; Mo., Ten. and Ut.

[D] Pa. and N. Y. separated in years 1864-1881, by aid of *Petroleum in U. S. and Possessions*, by Arnold and Kemnitzer.

[E] *Petroleum in U. S. and Possessions* gives following additional estimates not shown by official *Mineral Resources*; O., 1860-1875, 200,000 bbls.; W. Va., 1860-1875, 2,800,000 bbls.; Ky., 1860-1882, 161,000 bbls.

[F] N. Y. incl. with Pa.



Twenty five years...

CONTINUOUS SERVICE

On September 15, 1927, one of the first Separators manufactured by National Tank Company was set on a lease in Seminole County, Oklahoma. Initial production was 250 barrels per hour from a 4284 foot well. Over the years, production has gradually declined. Production is now much less per day, but this is the story of one National Separator — still serving after 25 years' continuous operation. Comparable results are experienced by operators throughout the oil producing world. Make your next Separator a National.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

United States Crude Oil Production, By States, By Years (Part 2)

Data in thousands of barrels; from *Mineral Resources and Minerals Yearbook*, except where otherwise indicated in footnotes.

New York, Ohio, Pennsylvania, West Virginia, and U. S. Total, 1859-1885

Year	New York	Penn-syl-vania	U.S.	Value at Wells $1,000	[O] Value per Bbl. $	Year	New York	Penn-syl-vania	Total U.S.	Value at Wells $1,000	[O] Value per Bbl. $	Year	New York	Ohio	Penn-syl-vania	W. Va.	Total U.S.	Value at Wells $1,000	[O] Value per Bbl. $
1856	.....	.....	.....	.....	.....	1866	[D]144	[D]3,454	3,598	13,455	3.75	1876	[D]359	32	[D]8,610	120	9,133	22,983	2.52
1857	.....	.....	.....	.....	.....	1867	[D]134	[D]3,213	3,347	8,067	2.40	1877	[D]525	30	[D]12,610	172	13,350	31,789	2.38
1858	.....	.....	.....	.....	.....	1868	[D]146	[D]3,500	3,646	13,217	3.62	1878	[D]607	38	[D]14,557	180	15,397	18,045	1.17
1859	.....	2	2	32	20.00	1869	[D]169	[D]4,046	4,215	23,730	5.60	1879	[D]787	29	[D]18,898	180	19,914	17,211	.86
1860	.....	500	500	4,800	9.60	1870	[D]211	[D]5,030	5,261	20,504	3.90	1880	[D]1,041	39	[D]24,987	179	26,286	24,601	.94
1861	.....	2,114	2,114	1,036	.52	1871	[D]208	[D]4,997	5,205	22,591	4.40	1881	[D]1,095	34	[D]26,281	151	27,661	25,448	.92
1862	.....	3,057	3,057	3,210	1.05	1872	[D]252	[D]6,041	6,293	21,440	3.75	1882	6,685	40	23,368	128	30,350	23,631	.78
1863	.....	2,611	2,611	8,226	3.15	1873	[D]396	[D]9,498	9,894	18,100	1.80	1883	4,004	47	19,125	126	23,450	25,790	1.10
1864	[D F H]	[D F]2,116	2,116	20,897	8.15	1874	[D]437	[D]10,490	10,927	12,648	1.15	1884	3,231	90	20,541	90	24,218	20,596	.85
1865	[D]100	[D]2,398	2,498	16,460	6.59	1875	[D]352	[L]8,436	8,788	7,368	.97	1885	2,658	662	18,118	91	21,859	19,198	.88

New York, North Dakota, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Utah, Virginia, West Virginia, Wyoming, and U. S. Total, 1886 to Now

Year	New York	N. Da-kota	Ohio	Okla-homa	Penn-sylvania	Tenn-essee	Texas	[A] Utah	Vir-ginia	West Virginia	Wy-oming	[B] Al-aska	[C] Un-class-ified	Total United States	Value at Wells $1,000	[O] Value per Bbl. $
1886	2,151	.....	1,783	.....	23,647	[G]	.....	.....	.....	102	.....	.....	.....	28,065	19,996	.71
1887	2,075	.....	5,023	.....	20,281	[G]	.....	.....	.....	145	.....	.....	.....	28,283	18,877	.67
1888	1,789	.....	10,011	.....	14,700	[G]	.....	.....	.....	119	.....	.....	.....	27,612	17,948	.65
1889	1,897	.....	12,472	.....	19,591	[G]	[H]	.....	.....	544	.....	.....	.....	35,164	26,963	.77
1890	1,658	.....	16,125	.....	26,800	[G]	.....	.....	.....	493	.....	.....	.....	45,824	35,365	.77
1891	1,585	.....	17,740	[H]	31,424	[G]	[H]	.....	.....	2,406	.....	.....	.....	54,293	30,527	.56
1892	1,273	.....	16,363	[H]	27,149	[G]	[H]	.....	.....	3,810	.....	.....	.....	50,515	25,907	.51
1893	1,032	.....	16,249	[H]	19,283	[G]	[H]	.....	.....	8,446	.....	.....	.....	48,431	28,950	.60
1894	942	.....	16,792	[H]	18,078	[G]	[H]	.....	.....	8,577	2	.....	.....	49,344	35,522	.72
1895	913	.....	19,545	[H]	18,231	[G]	[H]	.....	.....	8,120	4	.....	.....	52,892	57,632	1.09
1896	1,205	.....	23,941	[H]	19,379	[G]	1	.....	.....	10,020	3	.....	.....	60,969	58,519	.96
1897	1,279	.....	21,561	1	17,983	[G]	66	.....	.....	13,090	4	.....	.....	60,476	40,874	.68
1898	1,205	.....	18,739	.....	14,743	[G]	546	.....	.....	13,615	6	.....	.....	55,364	44,193	.80
1899	1,321	.....	21,142	.....	13,054	[G]	669	.....	.....	13,911	6	.....	.....	57,071	64,604	1.13
1900	1,301	.....	22,363	6	13,258	[G]	836	.....	.....	16,196	6	.....	.....	63,621	75,989	1.19
1901	1,207	.....	21,648	10	12,625	[G]	4,394	.....	.....	14,177	5	.....	.....	69,389	66,417	.96
1902	1,120	.....	21,014	37	12,064	[G]	18,084	.....	.....	13,513	6	.....	.....	88,767	71,179	.80
1903	1,163	.....	20,480	139	11,355	[G]	17,956	.....	.....	12,900	9	.....	.....	100,461	94,694	.94
1904	1,113	.....	18,877	1,367	11,126	[G]	22,241	.....	.....	12,645	12	[N]	.....	117,081	101,175	.86
1905	1,118	.....	16,347	[I]8,264	10,437	[G]	28,136	.....	.....	11,578	8	.....	.....	134,717	84,157	.62
1906	1,243	.....	14,788	[I]18,091	10,257	[G]	12,568	.....	.....	10,121	7	.....	.....	126,494	92,445	.73
1907	1,212	.....	12,207	43,524	10,000	[G]	12,323	[M]	.....	9,095	[M]9	[N]	.....	166,095	120,107	.72
1908	1,160	.....	10,859	45,799	9,424	.....	11,207	[M]	.....	9,523	[M]18	.....	.....	178,527	129,079	.72
1909	1,135	.....	10,633	47,859	9,299	.....	9,534	[M]	.....	10,745	[M]20	.....	.....	183,171	128,329	.70
1910	1,054	.....	9,916	52,029	8,795	.....	8,899	[M]	.....	11,753	[M]115	.....	.....	209,557	127,900	.61
1911	953	.....	8,817	56,069	8,248	.....	9,526	[M]	.....	9,796	[M]187	[N]	.....	220,449	134,045	.61
1912	874	.....	8,969	51,427	7,838	.....	11,735	[M]	.....	12,129	[M]1,572	[K]	4	222,935	164,213	.74
1913	948	.....	8,781	63,579	7,917	.....	15,010	[N]	.....	11,567	2,407	[K]	11	248,446	237,121	.95
1914	939	.....	8,536	73,632	8,170	.....	20,068	[N]	.....	9,680	3,560	[K]	8	265,763	214,125	.81
1915	888	.....	7,825	97,915	7,838	.....	24,943	[N]	.....	9,265	4,246	[K]	14	281,104	179,463	.64
1916	874	.....	7,744	107,072	7,593	[L]1	27,645	[N]	.....	8,731	6,234	[K]	8	300,767	330,900	1.10
1917	880	.....	7,751	107,508	7,733	[L]12	32,413	[N]	.....	8,379	8,978	[K]	10	335,316	522,635	1.56
1918	809	.....	7,285	103,347	7,408	[L]8	38,750	[N]	.....	7,867	12,596	[K]	8	355,928	703,944	1.98
1919	851	.....	7,736	86,911	8,137	15	79,366	[N]	.....	8,327	13,172	[K]	12	378,367	760,266	2.01
1920	906	.....	7,400	106,206	7,438	14	96,868	[K]	.....	8,249	16,831	[K]	13	442,929	1,360,745	3.07
1921	988	.....	7,335	114,634	7,418	12	106,166	.....	.....	7,822	19,333	[K]	12	472,183	814,745	1.73
1922	1,000	.....	6,781	149,571	7,425	10	118,684	.....	.....	7,021	26,715	[K]	13	557,531	895,111	1.61
1923	1,250	.....	7,085	160,929	7,609	8	131,023	.....	.....	6,358	44,785	[K]	18	732,407	978,430	1.34
1924	1,440	.....	6,811	173,538	7,486	10	134,522	[K]	.....	5,920	39,498	[K]	13	713,940	1,022,683	1.43
1925	1,695	.....	7,212	176,768	8,097	24	144,648	[K]	.....	5,763	29,173	[K]	12	763,743	1,284,960	1.68
1926	1,956	.....	7,272	179,195	8,961	43	166,916	[K]	.....	5,946	25,776	[K]	8	770,874	1,447,760	1.88
1927	2,242	.....	7,593	277,775	9,526	60	217,389	[K]	.....	6,023	21,307	[K]	7	901,129	1,172,830	1.30
1928	2,603	.....	7,015	249,857	9,956	46	257,320	[K]	.....	5,661	21,461	[K]	6	901,474	1,054,880	1.17
1929	3,377	.....	6,743	255,004	11,820	19	296,876	[K]	.....	5,574	19,314	[K]	7	1,007,323	1,280,417	1.27
1930	3,647	.....	6,486	216,486	12,803	21	290,457	[K]	.....	5,071	17,868	[K]	7	898,011	1,070,200	1.19
1931	3,363	.....	5,327	180,574	11,892	6	332,437	[K]	.....	4,472	14,834	[K]	7	851,081	550,630	.65
1932	3,508	.....	4,644	153,244	12,412	5	312,478	[K]	.....	3,876	13,418	[K]	16	785,159	680,460	.87
1933	3,181	.....	4,235	182,251	12,624	5	402,609	[K]	.....	3,815	11,227	[K]	30	905,656	608,000	.67
1934	3,804	.....	4,234	180,107	14,478	10	381,516	[K]	.....	4,095	12,556	.....	41	908,065	904,825	1.00
1935	4,236	.....	4,082	185,288	15,810	[K]	392,666	[K]	.....	3,902	13,755	.....	65	996,596	961,440	.96
1936	4,663	.....	3,847	206,555	17,070	[K]	427,411	[K]	.....	3,847	14,582	.....	63	1,099,687	1,199,820	1.09
1937	5,478	.....	3,559	228,839	19,189	[K]	510,318	[K]	.....	3,845	19,166	.....	77	1,279,160	1,513,340	1.18
1938	5,045	.....	3,298	174 994	17,426	[K]	475,850	[K]	.....	3,684	19,022	.....	82	1,214,355	1,373,060	1.13
1939	5,098	.....	3,156	159,913	17,382	50	483,528	4	.....	3,580	21,454	.....	.....	1,264,962	1,294,470	1.02
1940	4,999	.....	3,159	156,164	17,353	24	493,209	3	.....	3,444	25,711	.....	.....	1,353,214	1,385,440	1.02
1941	5,185	.....	3,510	154,702	16,750	12	505,572	4	.....	3,433	29,878	.....	.....	1,402,228	1,602,000	1.14
1942	5,421	.....	3,543	140,690	17,779	9	483,097	.....	.....	3,574	32,812	.....	.....	1,386,645	1,643,470	1.19
1943	5,059	.....	3,322	123,152	15,757	10	594,343	.....	2	3,349	34,253	.....	.....	1,505,613	1,809,020	1.20
1944	4,697	.....	2,937	124,616	14,118	8	746,699	.....	4	3,070	33,356	.....	.....	1,677,904	2,032,960	1.21
1945	4,648	.....	2,828	139,299	12,515	8	754,710	.....	4	2,879	36,219	.....	.....	1,713,655	2,094,250	1.22
1946	4,863	.....	2,908	134,794	12,996	10	760,215	.....	23	2,929	38,977	.....	.....	1,733,939	2,442,550	1.41
1947	4,762	.....	3,108	141,019	12,690	8	820,210	.....	61	2,617	44,772	.....	.....	1,856,987	3,577,890	1.93
1948	4,621	.....	3,600	154,455	12,667	6	903,498	.....	33	2,692	55,032	.....	.....	2,020,185	5,245,080	2.60
1949	4,425	.....	3,483	151,660	11,374	18	744,834	637	43	2,839	47,890	.....	.....	1,841,940	4,674,770	2.54
1950	4,143	.....	3,383	164,599	11,859	12	829,874	1,228	21	2,808	61,631	.....	.....	1,973,574	4,963,380	2.51
1951	4,254	22	3,097	187,789	11,150	14	1,010,128	1,425	12	2,743	67,932	.....	.....	2,244,529	5,656,213	2.52
1952[P]	4,382	1,503	3,222	192,252	11,072	9	1,030,350	1,736	15	2,574	68,311	.....	.....	2,294,016	5,780,920	2.52
Total	185,647	1,525	627,318	6,641,505	1,147,385	527	15,763,337	5,037	218	446,277	1,052,041	.....	572	45,457,633	69,665,882	1.53

[G] Tenn. incl. with Ky., 1876-1907, incl.

[H] Less than 500 bbls.

[I] Figures for Okla. and Kan. for years 1905-1906 shown together by *Mineral Resources;* here divided by aid of *Petroleum in U. S. and Possessions,* by Arnold and Kemnitzer.

[J] Mich. shown with Mo. in 1900-1911.

[K] Included under "Unclassified."

[L] Ky. and Tenn. in 1916-18 obtained with aid of *Mineral Resources and Petroleum in U. S. and Possessions.*

[M] Small prod. of Ut. (mostly used as fuel) shown with Wyo.

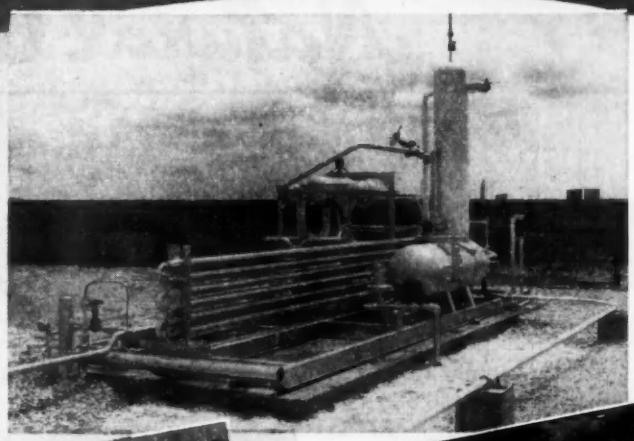
[N] Little prod. but no record available.

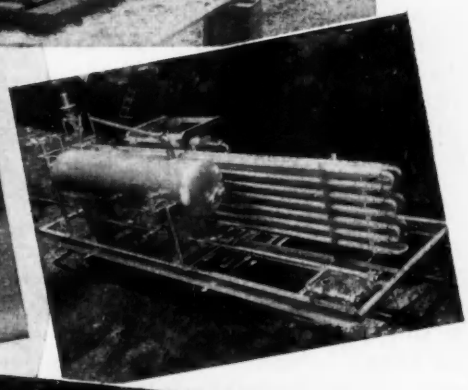
[O] Average price per bbl. for 1859-1875 from *Petroleum in U. S. and Possessions;* remainder from *Mineral Resources* and *Minerals Yearbook* except 1950 and 1951 estimated.

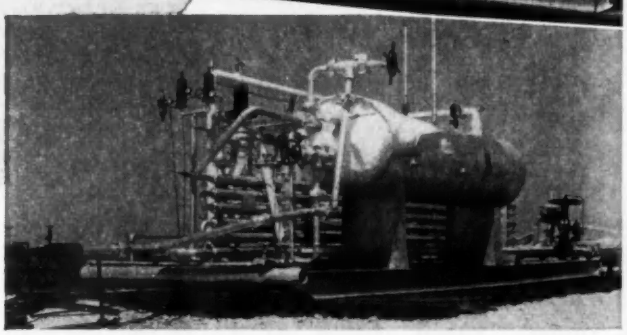
[P] Bureau of Mines for first 10 months; Nov. and Dec. est. by WORLD OIL, from weekly reports of API and other sources.

"IT PAYS TO PICK PARKERSBURG"

There's a HYRECO PROCESSING UNIT to meet *EVERY* Producing Condition







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HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

Natural Gasoline

Output to Top 1952 High

PRODUCTION AND processing of natural gasoline and allied products last year increased 7.2 percent from the previous year on a daily average yield of 603,429 barrels, up 40,383 barrels from 1951. The 1952 rise was more than half as great as the increase of 12.9 percent experienced in 1951 over 1950. Gross production for 1952 amounted to 220,855,000 barrels.

Expected this year is a further increase—to 231 million barrels for the year. That would amount to a daily average output of 632,877 barrels, or 4.9 percent greater than 1952. That expansion programs have largely been completed is indicated from the decline in rate increases from 1951.

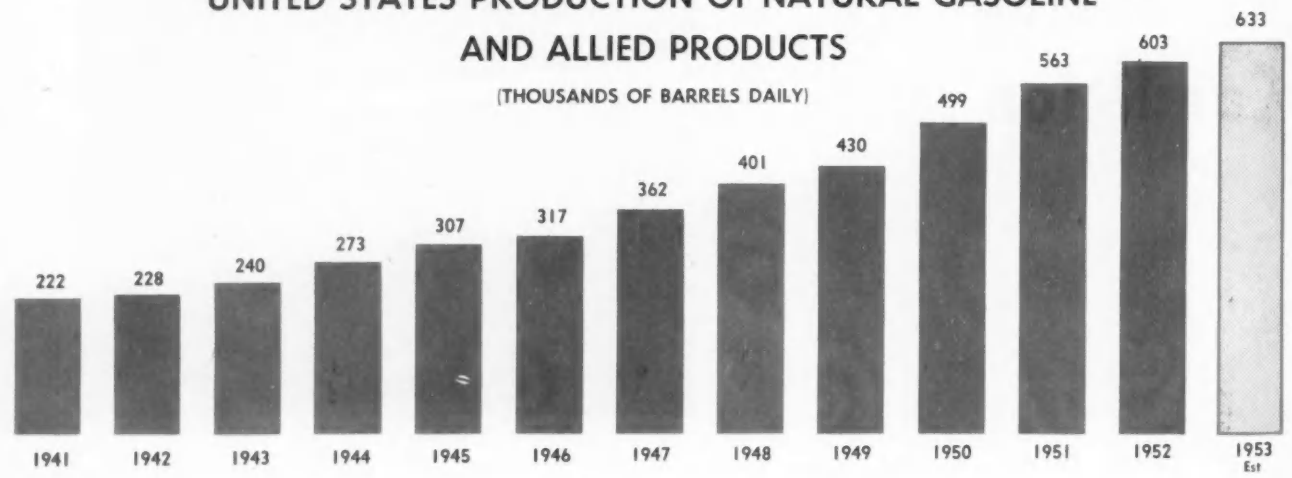
Texas again maintained its state lead for production of natural gasoline and allied products during 1952. It also recorded the largest volume increase—24,400 barrels a day average—for an 8.2 percent upsurge from the previous year of 297,600 barrels to 322,000 barrels. That increase represented a major share of the total increase for continental U. S.

California trailed Texas with its 1952 daily average yield of 81,700 barrels, up 700 barrels a day, or .9 percent, from 1951 daily production.

Louisiana and Oklahoma followed in that order—with daily average yields of 62,800 barrels and 52,200 barrels, respectively. Oklahoma experienced a 10.8 percent upward surge in daily output, or 5100 barrels, from a daily average of 47,100 barrels marked up the previous year.

New Mexico was the nation's fifth largest producer of natural gasoline and allied products, with a 1952 daily average yield of 18,100 barrels as compared with 15,700 barrels a day the previous year.

Three more states—West Virginia, Kansas and Kentucky—completed the list of states with daily average production exceeding 10,000 barrels. In moving its daily average production from 5700 barrels in 1951 to 12,400 barrels last year, Kentucky recorded a 47.5 percent rise.



(All Figures in Barrels)

YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average
1918	6,727,000	18,450	1931	43,617,000	119,499	* Natural Gasoline and Allied Prod.		
1919	8,370,000	22,931	1932	36,281,000	99,128	1941	80,855,000	221,521
1920	9,161,000	25,029	1933	33,810,000	92,630	1942	83,222,000	228,279
			1934	36,556,000	100,154	1943	87,716,000	240,318
1921	10,713,000	29,350	1935	39,333,000	107,762	1944	100,046,000	273,350
1922	12,044,000	32,997				1945	112,004,000	306,861
1923	19,434,000	53,244	1936	42,770,000	116,858			
1924	22,235,000	60,751	1937	49,177,000	134,732	1946	115,739,000	317,093
1925	26,845,000	75,547	1938	51,347,000	140,677	1947	132,173,000	362,118
			1939	51,650,000	141,507	1948	146,721,000	400,877
1926	32,455,000	88,917	1940	55,700,000	152,186	1949	157,086,000	430,373
1927	39,075,000	107,054				1950	181,961,000	498,523
1928	43,191,000	118,009						
1929	53,183,000	145,707				1951	205,512,000	563,046
1930	52,631,000	144,194				1952	220,855,000	603,429
						1953 Est	231,000,000	632,877

* Bureau began a new series covering 1941 and subsequent years, which includes cycle condensate.

Production of Natural Gasoline and Allied Products, by States, by Years

(Natural Gasoline, Cycle Products, and Liquefied Petroleum Gases)

(THOUSANDS OF BARRELS)

YEAR	Arkansas	California	Colorado	Illinois	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Montana	New Mexico
Natural Gasoline:											
1911	.....	1	.....	4	.....	.....	.....	....	....	....	....
1912	.....	25	.....	7	.....	.....	.....	....	....	....	....
1913	.....	82	.....	14	.....	.....	.....	....	....	....	....
1914	.....	180	.....	28	.....	.....	.....	....	....	....	....
1915	.....	306	.....	25	1	.....	5	....	....	....	....
1916	.....	409	.....	54	5	17	50	....	....	....	....
1917	.....	686	.....	117	28	91	119	....	....	....	....
1918	.....	768	.....	109	57	79	167	....	....	....	....
1919	.....	962	.....	144	78	122	240	....	....	....	....
1920	.....	1,148	.....	144	103	107	253	....	....	....	....
1921	.....	1,386	.....	179	85	101	365	....	....	....	....
1922	102	1,598	.....	185	68	124	700	....	....	....	....
1923	385	4,127	.....	175	209	181	969	....	....	....	....
1924	418	5,538	.....	216	278	173	1,145	....	....	....	....
1925	469	7,219	1	235	466	183	1,035	....	....	....	....
1926	723	9,271	7	238	604	183	1,037	....	....	....	35
1927	893	11,858	22	211	859	178	1,068	....	....	....	44
1928	778	13,907	45	186	875	173	1,310	....	....	....	36
1929	796	20,008	39	169	863	143	1,547	....	....	....	25
1930	730	19,754	31	164	836	158	1,755	....	....	....	87
1931	626	16,198	16	120	778	130	1,382	....	....	....	423
1932	444	13,140	11	109	590	116	1,100	....	....	....	417
1933	362	11,817	10	87	592	108	880	4	....	31	456
1934	310	12,054	15	91	664	99	966	14	....	30	518
1935	311	12,729	10	63	774	142	1,184	44	....	41	466
1936	285	14,128	11	56	899	143	1,731	48	....	49	689
1937	269	14,855	10	61	1,358	175	2,534	57	....	54	911
1938	611	15,736	9	58	1,333	167	2,277	86	....	42	1,181
1939	587	14,458	9	95	1,481	185	2,240	71	....	51	1,303
1940	764	13,988	9	511	1,541	228	2,708	93	....	62	1,326
1941	669	13,741	9	1,306	1,736	245	4,786	135	....	61	1,645
Cumulative	10,532	252,077	264	5,161	17,161	3,743	33,553	552	....	421	9,562
Natural Gasoline and Allied Products:											
1941	819	15,709	9	2,218	2,040	842	5,374	135	....	94	1,929
1942	1,016	15,079	8	3,317	1,948	873	7,049	60	....	108	2,123
1943	1,353	16,508	†	4,417	2,029	1,031	7,287	29	....	111	1,929
1944	1,798	18,364	†	4,628	1,663	1,161	11,730	202	....	114	1,932
1945	2,046	21,232	†	4,190	1,729	1,116	13,077	324	....	112	2,329
1946	2,012	21,679	20	3,847	1,966	1,282	13,495	294	....	109	2,468
1947	2,240	25,336	24	3,869	2,362	1,422	14,973	102	475	137	2,692
1948	2,259	26,549	33	3,539	2,561	1,566	16,901	62	1,123	201	3,103
1949	2,280	27,154	342	3,218	2,647	1,620	19,254	86	1,271	230	4,025
1950	2,333	28,328	†	3,107	3,687	1,779	20,768	79	1,312	251	5,019
1951	2,363	29,574	†	2,955	4,215	2,082	22,361	37	1,181	276	5,725
1952	2,592	29,884	†	‡2,767	4,600	4,548	22,971	‡	1,201	200	6,629
1951 Daily Average	6.5	81.0	.....	8.1	11.5	5.7	61.3	0.1	3.2	0.8	15.7
1952 Daily Average	7.1	81.7	.....	7.6	12.6	12.4	62.8	....	3.3	0.5	18.1

YEAR	New York	Ohio	Oklahoma	Pennsylvania	Texas	Utah	West Virginia	Wyoming	Others	Total	VALUE AT PLANT $ Thous.	VALUE AT PLANT ¢ Gal.
Natural Gasoline:												
1911	....	40	9	35	.....	....	87	.....	1	177	$ 532	7.2
1912	....	41	37	49	.....	....	127	.....	2	288	1,157	9.6
1913	....	49	154	88	.....	....	183	.....	3	573	2,458	10.2
1914	....	58	410	110	.....	....	221	.....	7	1,014	3,106	7.3
1915	....	52	754	140	3	....	258	.....	12	1,556	5,151	7.9
1916	6	63	1,151	231	31	....	447	.....	....	2,464	14,331	13.8
1917	4	130	2,741	329	165	....	778	.....	....	5,188	40,189	18.4
1918	5	161	3,898	376	174	....	895	38	....	6,727	50,364	17.8
1919	11	209	4,524	483	222	....	1,242	133	....	8,370	64,197	18.3
1920	10	238	4,259	504	784	....	1,403	207	....	9,160	71,788	18.7
1921	9	217	4,413	473	1,837	....	1,301	347	....	10,713	61,815	13.7
1922	12	205	4,510	441	2,272	....	1,352	475	....	12,044	72,711	14.4
1923	10	239	6,435	455	4,233	....	1,509	507	....	19,434	77,268	9.5
1924	11	225	7,168	458	4,442	....	1,466	697	....	22,235	82,233	8.8
1925	10	207	9,306	449	5,098	....	1,385	780	1	26,844	120,383	10.7
1926	13	258	11,327	484	5,788	....	1,519	967	1	32,455	136,412	10.0
1927	11	289	13,050	399	7,636	....	1,528	1,029	....	39,075	118,688	7.2
1928	9	314	14,755	395	7,727	....	1,660	1,020	1	43,191	138,944	7.7
1929	6	266	16,096	438	9,987	....	1,738	1,061	1	53,183	158,410	7.1
1930	5	213	14,076	398	11,698	....	1,508	1,217	1	52,631	128,160	5.8
1931	3	124	10,831	341	10,159	....	1,258	1,227	1	43,617	63,732	3.5
1932	3	123	9,014	278	8,836	....	1,042	1,057	1	36,281	49,244	3.2
1933	2	111	8,583	278	8,727	....	949	813	....	33,810	54,368	3.8
1934	2	140	8,462	257	11,109	....	997	828	....	36,556	60,523	3.9
1935	1	148	9,045	301	12,304	....	1,010	768	....	39,333	70,940	4.3
1936	....	166	9,967	340	12,394	....	1,057	807	....	42,770	84,572	4.7
1937	1	183	11,721	332	14,650	....	1,199	807	....	49,177	97,125	4.7
1938	1	176	11,155	254	16,331	....	1,200	730	....	51,347	87,266	4.0
1939	1	177	10,384	280	18,334	....	1,245	749	....	51,650	90,050	4.2
1940	....	192	9,509	366	22,191	....	1,400	812	....	55,700	68,261	2.9
1941	....	196	8,625	368	28,100	....	1,568	827	....	64,017	105,815	3.9
Cumulative	146	5,210	226,369	10,130	225,232	....	33,532	17,903	32	851,580	$2,180,193	6.1
Natural Gasln. and Allied Products:												
1941	....	196	10,795	381	37,116	....	2,334	864	....	80,855	119,120	3.5
1942	....	166	10,598	364	37,330	....	2,425	858	....	83,322	121,565	3.5
1943	....	155	10,055	417	39,191	....	2,332	†872	....	87,716	146,910	4.0
1944	....	173	10,042	417	44,534	....	2,117	†1,171	....	100,046	183,500	4.3
1945	....	154	9,909	338	52,103	....	2,086	†1,258	....	112,004	187,564	4.0
1946	....	149	9,881	262	54,357	14	2,868	1,036	....	115,739	180,281	3.7
1947	....	168	10,631	310	62,844	14	3,364	1,210	....	132,173	294,994	5.3
1948	....	150	11,178	291	72,116	14	3,637	1,438	....	146,721	458,977	7.4
1949	....	123	12,486	244	77,031	10	3,760	1,305	....	157,086	376,064	5.7
1950	....	103	14,733	246	93,650	†	4,623	†1,943	....	181,961	427,972	5.6
1951	....	81	17,207	213	108,627	†	6,091	†2,524	....	205,512	535,153	6.2
1952	....	39	19,122	242	117,861	†	5,290	†2,909	....	220,855	575,106	6.2
1951 Daily Average	....	0.2	47.1	0.7	297.6	....	16.7	6.9	....	563.0	.....	....
1952 Daily Average	....	0.1	52.2	0.7	322.0	....	14.4	7.9	....	603.4	.....	....

* Estimate † Wyoming in 1943-1944-1945 includes Colorado; in 1950, Colorado-Utah; in 1951-1952, Colorado-Nebraska-Utah. ‡ Illinois in 1952 includes Michigan.

Natural Gas

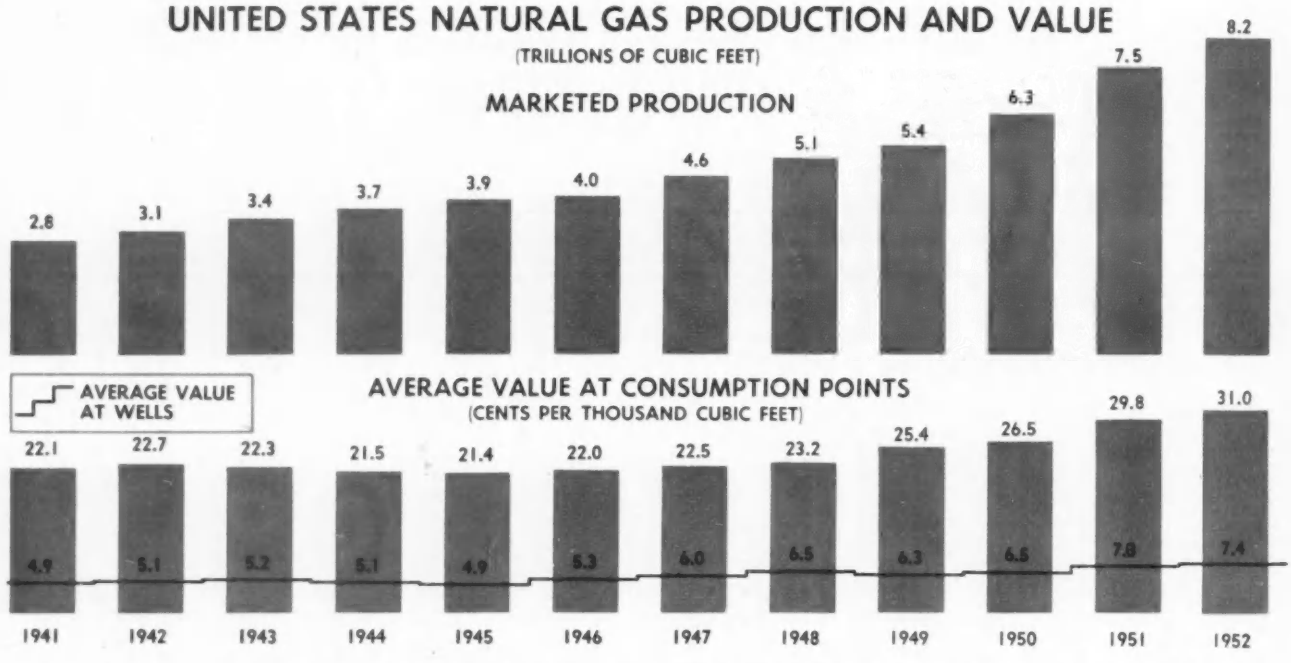
Production, Value Increase

THE U. S. NATURAL gas industry in 1952 surged upward from the records set during the previous year. Net gas production rose 10.1 percent, or 808,059 million cubic feet, to a total of 8,775,000 million cubic feet for the year.

Marketed production of natural gas in 1952 totaled approximately 8,203,400 million cubic feet, also an increase of 10 percent, comparing with 7,457,359, in 1951.

The value of this marketed natural gas at the wells averaged an estimated 7.4 cents per thousand cubic feet. This was a slight increase over the 7.3 cents average of 1951, reflecting higher rates provided under escalator clauses of gas purchase contracts.

A small amount of gas sold at the wells is lost in transit and through leaks and otherwise, but most of it is consumed, and the average value of the gas at points of consumption rose to 31.0 cents per thousand cubic feet in 1952 from 29.8 cents in 1951, as some rate increases went into effect



YEAR	*No. of Producing Wells	Marketed Production (Millions of Cubic Feet)	Average Value (Cents per Thousand Cubic Feet) At Wells	Average Value (Cents per Thousand Cubic Feet) At Points of Consumption
1918...	†40,369	721,001	‡	21.3
1919...	†41,500	745,916	‡	21.6
1920...	†42,700	798,210	‡	24.6
1921...	†43,900	662,052	‡	26.4
1922...	†45,100	762,546	11.1	29.1
1923...	†46,300	1,006,976	10.0	23.8
1924...	†47,500	1,141,521	9.3	22.2
1925...	†48,700	1,188,571	9.4	22.3
1926...	†49,900	1,313,019	9.5	22.9
1927...	†51,100	1,445,426	8.8	22.0
1928...	†52,300	1,568,139	8.9	23.2
1929...	53,545	1,917,693	8.2	21.6
1930...	55,020	1,943,421	7.6	21.4
1931...	55,756	1,686,436	7.0	23.3
1932...	54,160	1,555,990	6.4	24.7
1933...	53,660	1,555,474	6.2	23.7
1934...	54,130	1,770,721	6.0	22.3
1935...	53,700	1,916,595	5.8	22.4
1936...	53,960	2,167,802	5.5	22.0
1937...	55,050	3,407,620	5.1	21.9
1938...	53,770	2,295,562	4.9	21.8
1939...	53,530	2,476,756	4.9	21.6
1940...	53,880	2,660,222	4.5	21.7
1941...	55,500	2,812,658	4.9	22.1
1942...	56,150	3,053,475	5.1	22.7
1943...	57,200	3,414,689	5.2	22.3
1944...	58,780	3,711,039	5.1	21.5
1945...	60,660	3,918,686	4.9	21.4
1946...	62,740	4,030,605	5.3	22.0
§1947...	63,670	4,582,173	6.0	22.5
1948...	64,212	5,148,020	6.5	23.2
1949...	64,146	5,419,736	6.3	25.4
1950...	‡	6,282,060	6.5	26.5
1951...	‡	7,457,359	7.3	29.8
†1952...	‡	8,203,400	7.4	31.0

Source: U. S. Bureau of Mines. * Only dry natural gas producing wells included. † Estimated. ‡ Not available. § Beginning of new basis; includes gas stored and lost in transmission.

Summary of Annual Estimates of U. S. Reserves of Natural Gas and Natural Gas Liquids

(Source: American Gas Association and American Petroleum Institute)

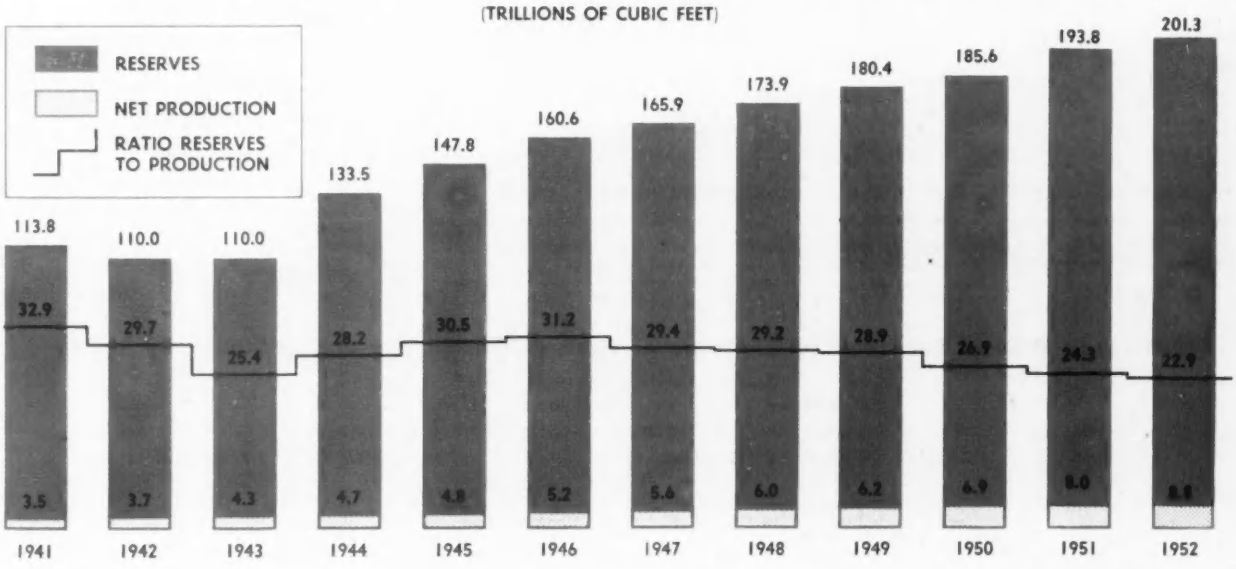
(Natural gas data in millions of cubic feet—14.65 psia, at 60° F.)

(Natural gas liquids in thousands of barrels of 42 U. S. gallons)

YEAR	Estimated Proved Reserves Beginning of Year	CHANGES IN RESERVES DURING YEAR: (Add.) Reserves Proved: Extensions and Revisions	Discoveries of New Fields and New Pools in Old Fields	Total Reserves Proved During Year (Cols. 2+3)	(Add or Deduct) Net Change in Storage	(Deduct) Net Production During Year	(Net Change) Increase or Decrease (Cols. 4+5—6)	Estimated Proved Reserves End of Year (Cols. 1+7)	Ratio of Year-End Reserves to Year's Prod. (Year's Supply) Col. 8÷Col. 6
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Natural Gas:									
1945	.....	.....	.....	.....	.....	.....	.....	147,789,367	....
1946	147,789,367	.....	.....	17,729,152	*	4,942,617	+12,786,535	160,575,901	32.5
1947	160,575,901	7,570,654	3,410,170	10,980,824	*	5,629,811	+5,351,013	165,926,914	29.5
1948	165,926,914	9,769,483	4,129,089	13,898,572	+51,482	6,007,628	+7,942,426	173,869,340	28.9
1949	173,869,340	8,061,429	4,612,870	12,674,299	+82,746	6,245,041	+6,512,004	180,381,344	28.9
1950	180,381,344	9,172,381	2,877,351	12,049,732	+54,301	6,892,678	+5,211,355	185,592,699	26.9
1951	185,592,699	13,013,606	3,039,385	16,052,991	+132,751	7,966,941	+8,218,801	193,811,500	24.3
†1952	193,811,500	.....	.....	16,000,000	+250,000	8,775,000	+7,475,000	201,286,500	22.9
Natural Gas Liquids:									
1946	.....	.....	.....	.....	.....	129,262	.....	3,163,219	24.5
1947	3,163,219	192,237	59,301	251,538	.....	160,782	+ 90,756	3,253,975	20.2
1948	3,253,975	405,874	64,683	470,557	.....	183,749	+286,808	3,540,783	19.3
1949	3,540,783	294,211	92,565	386,776	.....	198,547	+188,229	3,729,012	18.8
1950	3,729,012	707,879	58,183	766,062	.....	227,411	+538,651	4,267,663	18.8
1951	4,276,663	648,497	75,494	723,911	.....	267,052	+456,939	4,724,602	17.7
†1952	4,724,602	.....	.....	633,500	.....	‡285,102	+348,398	5,073,000	17.8

* Not Estimated. † Estimated by WORLD OIL. ‡ Includes 220,855 plant production of natural gasoline, etc.; 31,747 lease condensate; estimated 32,500 losses and waste.

UNITED STATES NATURAL GAS RESERVES AND PRODUCTION



YEAR	Reserves at End of Year (Billions of Cubic Feet)	Authority for Estimate of Reserves	Marketed Production (Billions of Cubic Feet)	Years' Supply in Reserve
1918...	15,000	E. Holley Poe et al. in report	721	20.8
1919...	15,000	September 23, 1947	746	20.1
1920...	15,000	" " "	798	18.8
1921...	15,000	" " "	662	22.7
1922...	15,000	" " "	763	19.7
1923...	15,000	" " "	1,007	14.9
1924...	15,000	" " "	1,142	13.1
1925...	23,000	*Gas Facts, 1945 and 1946*	1,189	19.3
1926...	23,000	" "	1,313	17.5
1927...	23,000	" "	1,445	15.9
1928...	23,000	" "	1,568	14.7
1929...	23,000	" "	1,918	12.0
1930...	46,000	Earl P. Hines, then Cities Service	1,943	23.7
1931...	46,000	Co.	1,686	27.3
1932...	46,000	" " "	1,556	29.6
1933...	46,000	" " "	1,555	29.6
1934...	62,000	Ralph E. Davis, Consulting Engineer	1,771	35.0
1935..	62,000	Ralph E. Davis, Consulting	2,408	25.7
1936..	62,000	Engineer	2,571	24.1
1937..	66,000	" " "	2,854	23.1
1938..	70,000	Lyon F. Terry, Chase Nat'l. Bank	2,960	23.6
1939..	70,000	" " "	3,162	22.1
1940..	85,000	Ralph E. Davis, Consulting Engineer	3,331	25.5
1941..	113,800	Petroleum Administration for War	3,459	32.9
1942..	110,000	" " "	3,701	29.7
1943..	110,000	" " "	4,336	25.4
1944..	133,500	" " "	4,731	28.2
1945..	147,789	American Gas Association	4,840	30.5
1946..	160,576	" "	5,152	31.2
*1947..	165,927	" "	5,650	29.4
1948..	173,869	" "	5,958	29.2
1949..	180,381	" "	6,245	28.9
1950..	185,593	American Gas Association	6,893	26.9
1951..	193,811	"	7,967	24.3
1952..	201,286	World Oil	8,775	22.9

* Beginning of new basis; includes gas stored and lost in transmission.

over the country, especially on rates to industrial consumers.

Beginning 1952 with estimated proved reserves of 193,811,500 million cubic feet of natural gas, the nation proved up through extensions, revisions and discoveries of new fields and new pools in old fields a total of 16,000,000 million cubic feet. Into storage went 250,000 million cubic feet.

Thus, with a production of 8,775,000 million cubic feet, a total of 7,475,000 million cubic feet of natural gas was added last year to estimated proved reserves at the close of 1952, sending that figure to the all-time high of 201,286,500 million cubic feet. That reserve was equivalent to production at the 1952 rate for a period of 22.9 years.

Estimated proved natural gas reserves at the close of the previous year of 193,811,500 million cubic feet were sufficient to allow production at that year's rate of 7,966,941 million cubic feet for the slightly longer period of 24.3 years.

Likewise, estimated proved reserves of natural gas liquids increased from 4,724,602,000 barrels at the close of the previous year to 5,073,000,000 barrels at the end of 1952.

(See table, Page 199)

Estimated Proved Recoverable Reserves of Natural Gas Liquids in the United States, By States

(Includes Condensate, Natural Gasoline, and Liquefied Petroleum Gas)
Sources: American Gas Association and American Petroleum Institute
(Thousands of Barrels of 42 U. S. Gallons)

	Reserves as of Dec. 31, 1950	CHANGES IN RESERVES DURING 1951			RESERVES AS OF DECEMBER 31, 1951			
		Extensions and Revisions	Discoveries of New Fields and New Pools in Old Fields	Net Production	Total (Columns 6 + 7 + 8, also Columns 1 + 2 + 3 Less Column 4)	Non-Associated	Associated	Dissolved
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Arkansas	52,938	(—) 110	80	1,858	51,050	30,326	7,167	13,557
*California	363,387	(—) 4,596	0	29,475	329,316	0	112,854	216,462
Colorado	12,921	(—) 521	0	490	11,910	301	0	11,609
Illinois	26,259	2,006	28	3,721	24,572	22	50	24,500
Indiana	152	13	17	33	149	18	22	109
Kansas	163,578	(—) 14	330	4,325	159,569	155,367	1,430	2,772
Kentucky	11,927	369	185	2,003	10,478	10,478†	0	0
*Louisiana	643,512	64,775	9,294	32,808	684,773	540,276	99,303	45,194
Michigan	1,018	89	1	99	1,009	595	0	414
Mississippi	55,897	47	995	4,649	52,290	25,750	20,912	5,628
Montana	3,547	79	0	285	3,341	3,341	0	0
Nebraska	235	1,808	666	123	2,586	2,314	169	103
New Mexico	93,897	44,221	661	8,160	130,619	47,842	32,580	50,197
Ohio	1,688	94	11	83	1,710	1,710†	0	0
Oklahoma	279,903	52,715	4,319	25,812	311,125	120,293	27,993	162,839
Pennsylvania	2,599	119	59	214	2,563	2,563†	0	0
*Texas	2,496,039	470,160	55,702	144,560	2,877,341	1,398,327	391,917	1,087,097
Utah	194	(—) 128	0	5	61	61	0	0
West Virginia	8,976	20,845	282	6,182	23,921	23,921†	0	0
Wyoming	48,987	(—) 3,478	2,543	2,166	45,886	40,623	5,263	0
‡Miscellaneous	9	4	321	1	333	0	0	333
Total	4,267,663	648,497	75,494	267,052	4,724,602	2,404,128	699,660	1,620,814

* Includes off-shore reserves. † Not allocated by types but occurring principally in the column shown.
‡ Miscellaneous includes, Alabama, Florida, and North Dakota.

Natural Gas Customers, Sales and Revenues
(Source: American Gas Association)

ITEM	Actual 1951	Estimated 1952	Percent Change
Customers End of Year	**17,239,000**	**20,028,000**	**+16.2**
Residential	15,835,000	18,424,000	+16.3
Commercial	1,323,000	1,509,000	+14.1
Industrial	62,000	74,000	+19.4
Other	19,000	21,000	+10.5
Customers, Average	**16,036,900**	**18,657,000**	**+16.3**
Residential	14,742,000	17,165,000	+16.4
Commercial	1,218,700	1,403,000	+15.1
Industrial	58,300	69,000	+18.4
Other	17,900	20,000	+11.7
Sale, Thousands of Therms	**44,718,300**	**49,192,000**	**+10.0**
Residential	14,008,700	15,094,000	+ 7.7
Commercial	3,985,900	4,336,000	+ 8.8
Industrial	24,838,500	27,792,000	+11.9
Other	1,885,200	1,970,000	+ 4.5
Revenues	**$1,667,154,000**	**$1,951,735,000**	**+17.1**
Residential	930,360,000	1,085,670,000	+16.7
Commercial	203,648,000	237,802,000	+16.8
Industrial	496,086,000	585,349,000	+18.0
Other	37,060,000	42,914,000	+15.8

Estimated Proved Recoverable Reserves of Natural Gas in the United States, By States

Source: American Gas Association
(Millions of Cubic Feet—14.65 psia, at 60 deg. F)

	Reserves[b] as of Dec. 31, 1950	CHANGES IN RESERVES DURING 1951				RESERVES AS OF DECEMBER 31, 1951[b]				
		Extensions and Revisions[b]	Discoveries of New Fields and New Pools in Old Fields[b]	Net Change in Underground Storage[c]	Net Production[d]	Total (Columns 7+8+9+10, Also Columns 1+2+3+4 Less Column 5)	Non-Associated[e]	Associated[f]	Dissolved[g]	Underground Storage[h]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Arkansas	907,593	27,545	38,965	(—) 4	42,785	931,314	478,298	149,733	301,287	1,996
California[i]	9,760,386	170,711	66,827	(—) 4,317	511,162	9,482,445	2,615,335	2,155,881	4,696,387	14,842
Colorado	1,115,473	22,955	24,504	0	24,481	1,138,451	487,134	42,142	609,175	0
Illinois	229,893	29,795	5,650	0	38,205	227,133	4,333	10,000	212,800	0
Indiana	31,190	2,520	3,340	297	6,540	30,807	3,500	4,500	21,760	1,047
Kansas	13,790,834	76,206	40,971	2,326	452,839	13,457,498	13,015,271	133,419	277,181	31,627
Kentucky	1,330,583	59,386	9,520	(—) 401	73,500	1,325,588	1,253,003	0	61,400	11,185
Louisiana[i]	28,533,266	1,147,998	480,933	0	1,157,166	29,005,031	23,147,675	3,829,371	2,027,985	0
Michigan	195,074	8,786	230	10,347	11,412	203,025	119,011	0	41,366	42,648
Mississippi	2,519,206	86,321	35,477	40	201,075	2,439,969	1,721,717	405,552	312,660	40
Montana	797,361	69,336	0	3,069	41,659	828,107	700,358	39,469	80,717	7,563
Nebraska	44,106	30,947	26,646	0	5,889	95,810	67,351	7,906	20,553	0
New Mexico	6,990,670	4,785,791	132,187	(—) 2,834	315,835	11,589,979	8,273,960	2,351,741	949,026	15,252
New York	64,779	100	0	4,814	2,900	66,793	50,642	0	528	15,623
Ohio	658,862	32,527	8,450	30,696	41,400	689,135	551,825	0	32,800	104,510
Oklahoma	11,634,287	769,182	117,604	10,380	727,116	11,804,337	7,368,214	1,007,720	3,393,654	34,749
Pennsylvania	627,171	38,272	33,000	43,012	122,000	619,455	480,191	0	38,400	100,864
Texas[i]	102,404,077	5,311,803	1,854,153	1,330	3,918,134	105,653,229	70,322,632	18,228,896	17,099,881	1,820
Utah	84,752	8,784	6,154	0	3,845	95,845	78,720	0	17,125	0
West Virginia	1,650,675	147,107	21,900	33,817	182,000	1,671,499	1,504,366	0	77,150	89,983
Wyoming	2,194,989	161,115	66,518	179	82,503	2,340,298	1,479,958	354,385	505,263	692
Miscellaneous[a]	27,472	26,419	66,356	0	4,495	115,752	47,913	0	67,839	0
Total	185,592,699	13,013,606	3,039,385	132,751	7,966,941	193,811,500	133,771,407	28,720,715	30,844,937	474,441

[a] Includes Alabama, Florida, Maryland. Missouri, North Dakota and Virginia. [b] Excludes gas loss due to natural gas liquids recovery. [c] The net difference between gas stored in and gas withdrawn from underground storage reservoirs, inclusive of adjustments. [d] Net production equals gross withdrawals less gas injected into producing reservoirs; changes in undergound storage are excluded. December production estimated occasionally. [e] Non-associated gas is free gas not in contact with crude oil in the reservoirs. [f] Associated gas is free gas in contact with crude oil in the reservoirs. [g] Dissolved gas is gas in solution with crude oil in the reservoirs. [h] Gas held in underground reservoirs for storage purposes only. [i] Includes off-shore reserves.

United States Marketed Production of Natural Gas, By States, By Years

(Millions of Cubic Feet)

Sources: U. S. Bureau of Mines, except for some figures for early years which are from "Petroleum in the United States and Possessions" by Ralph Arnold and William Kemnitzer, and except where otherwise indicated by footnotes.

YEAR	Arkansas	California	Colorado	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Montana	New Mexico	New York
*Pre–1906	281	9,810	631	1,505	471,800	81,865	13,243	31	.....	.....	.....	.....	31,340
1906	21	153	23	410	7,861	69,323	789	39	.....	.....	.....	.....	2,548
1907	*570	230	57	1,155	6,624	76,707	1,303	88	.....	.....	.....	.....	3,288
1908	*1,208	479	50	4,979	5,256	80,740	1,430	252	.....	.....	.....	.....	3,843
1909	*1,778	2,324	*45	8,473	6,159	75,074	2,097	1,365	1	.....	.....	.....	4,696
1910	*2,412	2,764	*40	6,723	5,760	59,380	1,357	4,110	1	.....	.....	.....	6,010
1911	*1,994	6,390	*35	6,762	4,365	38,800	1,275	9,786	2	.....	.....	.....	5,240
1912	*1,465	9,355	*30	5,603	3,618	28,068	1,951	14,493	2	.....	.....	.....	8,626
1913	*806	11,035	*27	4,767	2,921	22,884	1,821	26,653	2	.....	.....	.....	8,515
1914	*633	17,829	*24	3,548	2,580	22,628	1,422	26,775	2	.....	.....	.....	8,935
1915	992	21,891	*21	2,690	2,261	27,046	1,667	25,540	2	.....	6	.....	7,977
1916	2,388	31,643	*18	3,534	1,715	31,710	2,107	32,081	1	.....	213	.....	8,036
1917	5,610	49,427	*14	4,439	1,712	24,439	2,802	31,287	1	.....	334	.....	8,372
1918	5,295	39,719	10	4,473	1,667	27,825	3,022	36,094	1	.....	177	.....	8,451
1919	5,587	55,607	10	3,825	1,407	16,150	2,057	47,062	1	.....	858	.....	8,124
1920	9,027	66,041	8	3,013	1,779	21,158	3,345	58,274	.....	.....	818	.....	8,419
1921	4,260	75,942	4	2,646	1,066	15,717	4,820	58,004	.....	.....	336	.....	6,583
1922	9,700	84,580	4	3,383	947	20,289	5,872	70,267	1	.....	486	.....	6,947
1923	24,215	131,434	1	4,049	880	30,913	11,953	112,031	1	.....	1,470	.....	6,497
1924	36,616	189,692	48	4,072	998	25,580	12,875	160,945	1	.....	1,071	.....	6,196
1925	41,878	187,789	574	4,165	1,168	26,917	10,770	152,620	.....	.....	1,496	.....	6,210
1926	43,566	204,915	554	3,808	901	38,095	10,410	157,423	.....	.....	2,283	921	7,027
1927	30,450	212,364	1,725	3,741	1,124	42,646	10,206	186,961	1	.....	4,233	1,019	5,908
1928	20,235	246,215	2,931	3,051	1,290	45,644	15,383	227,821	469	.....	6,277	838	7,224
1929	19,928	342,214	2,787	2,983	1,012	38,469	27,588	261,138	4,526	90	9,659	3,054	8,387
1930	18,585	334,789	3,312	2,890	1,217	37,630	28,023	278,341	2,075	179	10,060	9,497	9,624
1931	13,300	305,930	2,536	2,130	1,337	38,742	27,870	224,155	472	6,048	10,949	19,354	7,868
1932	10,235	263,484	2,547	1,769	1,349	40,690	29,005	201,561	968	8,648	13,295	17,604	8,813
1933	8,288	259,799	2,449	1,631	1,544	41,596	31,380	197,826	1,528	8,679	14,391	19,148	6,865
1934	7,024	268,122	2,633	1,868	1,802	46,909	33,124	225,713	2,789	8,245	14,971	24,075	6,278
1935	6,167	284,109	2,843	1,448	1,777	57,125	39,738	249,450	4,203	9,643	19,870	27,931	8,288
1936	8,500	320,406	3,687	865	2,241	69,178	43,903	290,151	7,167	11,821	23,003	33,928	12,431
1937	9,690	329,769	3,186	1,040	1,551	83,890	55,719	315,301	9,080	13,348	24,765	46,337	21,325
1938	11,301	315,168	1,904	1,169	1,299	75,203	46,163	283,899	10,165	13,656	21,216	50,706	39,402
1939	10,107	348,361	2,015	2,746	791	80,556	47,771	294,370	10,726	14,527	23,178	60,284	29,222
1940	14,379	351,950	2,533	8,359	1,137	90,003	53,056	343,191	12,648	6,365	26,231	63,990	12,187
1941	19,148	374,905	3,256	10,053	1,522	111,121	69,067	403,855	13,916	4,268	28,499	64,655	10,456
1942	19,456	403,968	4,865	14,484	1,599	112,921	80,089	447,686	15,521	2,082	31,475	78,164	8,718
1943	36,469	457,757	6,445	18,120	1,450	133,729	92,364	505,294	18,006	1,461	31,562	86,500	8,062
1944	46,453	502,017	5,141	18,137	1,014	157,733	94,223	534,688	19,653	1,352	32,102	87,727	7,052
1945	46,600	502,442	4,914	16,663	1,543	145,959	81,714	542,789	21,874	4,587	31,829	105,023	9,210
1946	45,177	487,904	6,728	17,166	1,094	165,725	70,396	525,178	20,879	7,225	30,713	119,262	5,084
†*1947*	*50,440*	*544,950*	*8,259*	*16,679*	*666*	*202,177*	*80,040*	*573,151*	*25,479*	*39,987*	*32,549*	*142,566*	*4,776*
‡1947	50,630	560,510	8,392	17,023	877	209,321	96,459	581,398	18,812	40,037	34,282	142,740	4,600
1948	53,946	570,954	8,967	14,062	553	245,189	70,095	686,061	14,981	59,899	36,551	194,749	4,705
1949	47,788	550,903	8,490	12,391	334	294,078	51,851	732,845	14,753	68,062	35,291	204,961	3,693
1950	48,047	558,398	11,168	13,285	956	364,024	73,316	831,771	11,250	114,153	39,186	212,909	3,336
1951	44,656	566,751	14,128	11,425	845	417,538	76,097	1,054,199	11,194	158,845	36,424	300,169	3,214
1952	50,800	528,500	20,300	9,300	700	432,200	79,500	1,111,200	9,100	165,600	115,400	283,500	2,802
Total	897,661	11,446,738	142,110	295,821	565,403	4,439,127	1,552,488	12,562,062	256,775	728,820	714,980	2,259,045	426,044

YEAR	Ohio	Oklahoma	Pennsylvania	Texas	West Virginia	Wyoming	Others	Total United States	VALUE AT WELLS		VALUE AT POINTS OF CONSUMPTION	
									Total (Thousands of Dollars)	Average Per M Cubic Ft. (Cts.)	Total (Thousands of Dollars)	Average Per M Cubic Ft. (Cts.)
*Pre–1906	305,593	2,215	1,611,066	815	387,799	506	43,281	**961,781**	.....	....	426,448	14.4
1906	45,436	3,520	138,161	*1,000	119,400	*100	59	**388,843**	.....	....	46,874	12.1
1907	52,041	4,867	135,516	*1,200	122,687	*140	149	**406,622**	.....	....	54,222	13.3
1908	47,442	11,925	130,476	*1,500	112,181	*180	200	**402,141**	.....	....	54,640	13.6
1909	53,223	28,037	127,697	*3,000	166,435	*220	82	**480,706**	.....	....	63,207	13.1
1910	48,232	50,430	126,867	*4,000	190,706	*253	110	**509,155**	.....	....	70,756	13.9
1911	49,450	67,276	108,869	5,503	206,891	*265	90	**512,993**	.....	....	74,622	14.5
1912	56,210	73,799	112,150	7,470	239,007	*247	109	**562,203**	.....	....	84,564	15.0
1913	50,612	75,018	118,860	12,160	245,454	*273	90	**581,898**	.....	....	87,847	15.1
1914	68,270	78,167	110,745	13,434	236,489	*306	80	**591,867**	.....	....	94,116	15.9
1915	79,510	87,517	113,692	13,324	244,004	*321	118	**628,579**	.....	....	101,312	16.1
1916	69,888	123,517	130,484	15,810	299,319	*557	149	**753,170**	.....	....	120,227	16.0
1917	68,917	137,384	133,397	17,047	308,617	*1,209	102	**795,110**	.....	....	142,089	17.9
1918	61,261	124,317	123,813	13,440	265,161	4,339	1,926	**721,001**	.....	....	153,554	21.3
1919	63,153	163,649	113,489	24,710	234,095	6,014	118	**745,916**	.....	....	160,888	21.6
1920	58,938	154,467	125,787	37,063	239,719	10,312	42	**798,210**	.....	....	196,194	24.6
1921	47,412	124,058	86,144	44,504	174,921	15,608	27	**662,052**	.....	....	174,617	26.4
1922	51,481	140,631	101,276	47,945	195,288	23,427	22	**762,546**	84,873	11.1	221,535	29.1
1923	53,812	203,082	112,562	74,535	203,867	35,523	151	**1,006,976**	100,849	10.0	240,001	23.8
1924	47,396	214,452	105,863	107,247	182,285	46,036	148	**1,141,521**	105,779	9.3	253,856	22.2
1925	43,235	249,285	101,632	134,872	180,345	45,539	76	**1,188,571**	112,047	9.4	265,271	22.3
1926	47,363	286,421	107,089	175,392	180,223	46,567	61	**1,313,019**	124,693	9.5	300,168	22.9
1927	51,381	326,864	105,709	254,063	162,375	43,582	1,056	**1,445,428**	127,468	8.8	317,930	22.0
1928	56,341	320,861	99,466	301,990	163,018	47,490	1,595	**1,568,139**	139,898	8.9	363,726	23.2
1929	57,936	357,893	101,951	464,928	167,333	44,648	1,169	**1,917,693**	157,596	8.2	413,276	21.6
1930	63,394	348,116	88,706	517,880	144,180	43,219	1,704	**1,943,421**	147,048	7.6	416,090	21.4
1931	56,326	263,685	74,797	464,580	124,797	39,770	1,790	**1,686,436**	117,505	7.0	392,816	23.3
1932	51,466	255,487	61,611	456,832	100,540	28,938	1,148	**1,555,990**	98,985	6.4	384,632	24.7
1933	47,929	245,759	63,579	475,691	100,653	25,830	909	**1,555,474**	97,096	6 2	368,540	23.7
1934	50,330	254,457	86,238	602,976	109,161	23,148	858	**1,770,721**	106,438	6.0	395,378	22.3
1935	49,592	274,313	94,464	642,366	115,772	26,643	853	**1,916,595**	110,402	5.8	429,374	22.4
1936	46,994	280,481	110,362	734,561	138,076	29,322	725	**2,167,802**	119,193	5.5	476,813	22.0
1937	42,783	296,260	115,928	854,561	149,084	31,023	2,980	**2,407,620**	123,457	5.1	528,354	21.9
1938	35,257	263,164	76,547	882,473	134,342	26,678	5,850	**2,295,562**	113,571	4.9	500,698	21.8
1939	36,469	250,875	93,882	979,427	159,226	26,614	5,609	**2,476,756**	120,243	4.9	534,240	21.6
1940	40,639	257,626	90,725	1,063,538	188,751	27,346	5,568	**2,660,222**	120,493	4.5	577,939	21.7
1941	41,858	234,054	92,819	1,086,312	207,681	29,284	5,929	**2,812,658**	138,508	4.9	621,333	22.1
1942	45,055	269,704	93,532	1,170,345	215,193	33,124	5,494	**3,053,475**	154,236	5.1	692,737	22.7
1943	52,001	285,045	93,543	1,323,885	223,787	34,351	4,858	**3,414,689**	176,893	5.2	760,950	22.3
1944	51,724	310,888	92,987	1,525,515	181,452	34,521	6,660	**3,711,039**	189,809	5.1	794,271	21.5
1945	49,967	357,530	82,188	1,711,401	160,225	35,282	6,946	**3,918,686**	191,006	4.9	834,195	21.4
1946	61,570	380,938	92,443	1,776,148	178,958	33,266	4,751	**4,030,605**	212,251	5.3	882,356	22.0
†*1947*	*73,989*	*393,216*	*94,252*	*1,932,857*	*182,072*	*40,083*	*6,505*	*4,444,693*	*266,682*	*6.0*	*1,031,169*	*23.2*
‡1947	68,946	419,010	91,971	1,992,704	192,233	45,550	6,678	**4,582,173**	274,709	6.0	1,028,318	23.2
1948	65,619	480,573	87,578	2,289,923	203,681	52,424	7,510	**5,148,020**	333,173	6.5	1,193,559	24.1
1949	46,512	435,262	84,739	2,588,921	181,176	50,815	6,871	**5,419,736**	341,443	6.3	1,320,671	25.4
1950	43,163	482,360	91,137	3,126,402	189,980	62,062	5,157	**6,282,060**	408,776	6.5	1,597,930	26.5
1951	38,879	538,756	128,715	3,781,136	191,146	175,241	8,001	**7,457,359**	542,964	7.3	2,118,674	29.8
1952	28,800	699,500	112,400	4,252,100	179,400	114,900	7,400	**8,203,400**	607,052	7.4	2,428,000	31.0
Total	2,749,806	11,293,495	6,483,652	36,076,629	8,997,113	1,303,013	155,259	**103,316,639**	§	§	25,283,433	24.5

* Estimate. † Old basis, as in prior years; excludes gas stored and lost in transmission; not included below in totals. ‡ New basis, as in subsequent years; includes gas stored and lost in transmission; included below in totals. § Not available. ⁋ Wyoming includes Utah.

Petroleum Reserves

STATE	Estimated Proved Reserves Beginning 1952	CHANGES DURING YEAR (Additon) Reserves Proved During 1952	(Deduction) *Production During 1952	Net Change In Reserves (Increase or Decrease)	Estimated Proved Reserves at End of 1952	Ratio of Year-End Reserves to Year's Production (Year's Supply)
Alabama	7,860	4,400	972	+ 3,428	11,288	11.6
Arkansas	336,458	42,750	28,119	+ 14,631	351,089	12.5
California	3,760,870	435,885	359,346	+ 76,539	3,837,409	10.7
Colorado	325,178	18,825	29,436	— 10,611	314,567	10.7
Illinois	646,335	93,080	58,969	+ 34,111	680,446	11.5
Indiana	50,667	15,260	12,045	+ 3,215	53,882	4.5
Kansas	791,946	188,630	114,614	+ 74,016	865,962	7.6
Kentucky	58,549	12,760	12,070	+ 690	59,239	4.9
Louisiana	2,284,781	327,570	228,136	+ 99,434	2,384,215	10.5
Michigan	64,113	15,440	13,298	+ 2,142	66,255	5.0
Mississippi	385,387	37,310	34,499	+ 2,811	388,198	11.3
Montana	108,418	111,131	9,549	+ 101,582	210,000	22.0
Nebraska	15,918	12,840	2,413	+ 10,427	26,345	10.9
New Mexico	611,640	62,350	58,859	+ 3,491	615,131	10.5
New York	57,061	3,725	4,382	— 657	56,404	12.9
North Dakota	*	201,503	1,503	+ 200,000	200 000	133.1
Ohio	26,436	3,535	3,222	+ 313	26,749	8.3
Oklahoma	1,476,457	286,025	192,252	+ 93,773	1,570,230	8.2
Pennsylvania	95,002	16,070	11,072	+ 4,998	100,000	9.0
Texas	15,314,964	1,764,450	1,014,571	+ 749,879	16,064,843	15.8
Utah	29,683	7,285	1,736	+ 5,549	35,232	20.3
West Virginia	38,762	2,210	2,574	— 364	38,398	14.9
Wyoming	973,440	151,805	67,994	+ 83,811	1,057,251	15.5
†Miscellaneous	8,106	.....	638	— 638	7,468	11.7
TOTAL U. S.	27,468,031	3,814,839	2,262,269	+1,552,570	29,020,601	12.8

* Included below with miscellaneous.
† Missouri, Florida, Tennessee, Virginia, North Dakota for beginning of 1952; same states exc luding North Dakota for end of 1952.

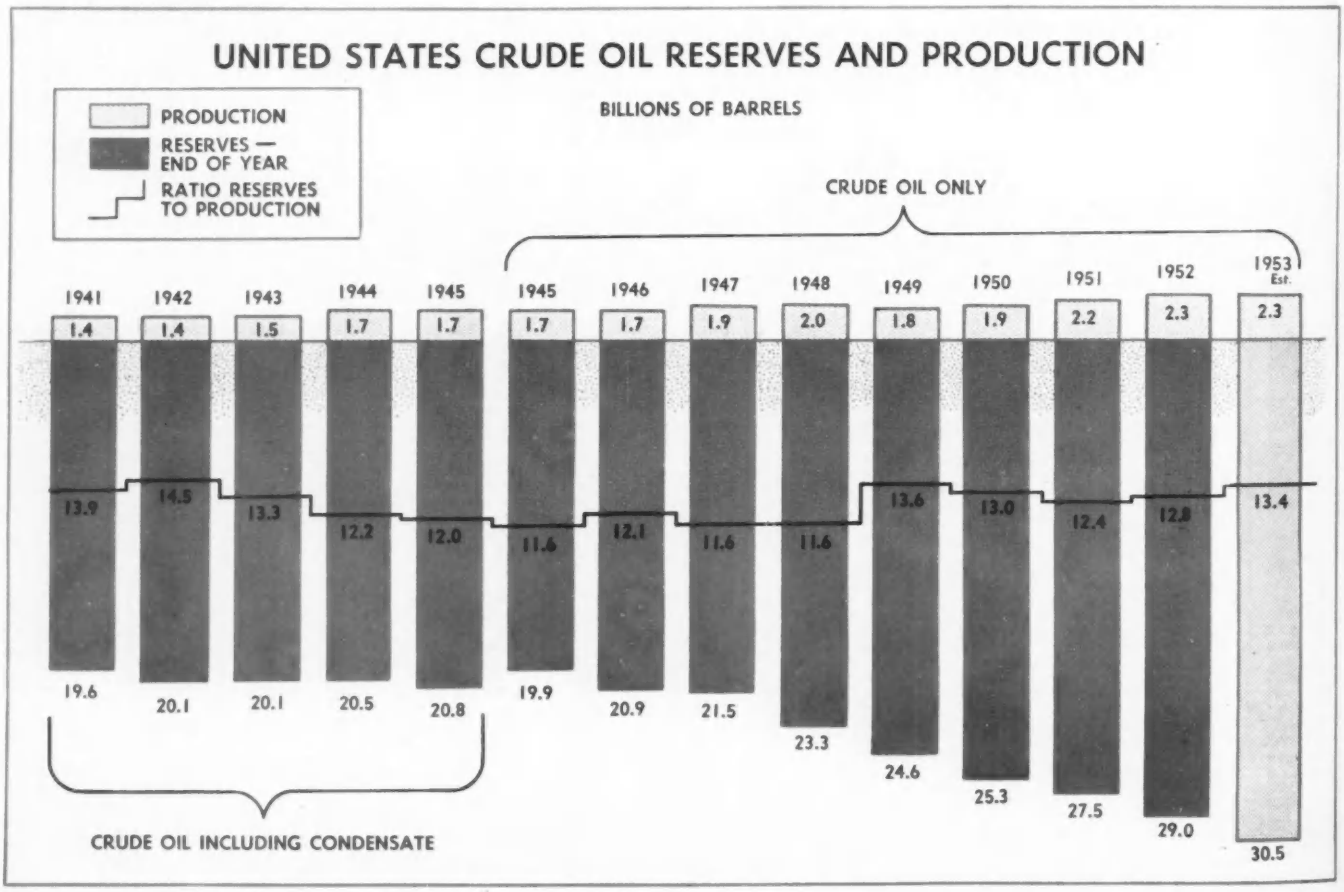
Up, But Years'

LAST YEAR THE U. S. proved up 4,448,339,000 barrels of new reserves of oils, increasing the nation's reservoir of proved unproduced reserves of liquid hydrocarbons (crude and natural gas liquids) to 34,093,601,000 barrels, the highest ever. Based on the 1952 producing rate of 2,547,371,000 barrels, the U. S. had a ratio of reserves to year's production of 13.4 years at the close of 1952. That ratio

Estimated Changes in U. S. Reserves of Crude Oil (Only) in 1952, by States

Sources: Reserves in 1952 from American Petroleum Institute; reserves proved in 1952 estimated by WORLD OIL; production in 1952 from Bureau of Mines except November and December from A.P.I.

(THOUSANDS OF BARRELS)



Supply Lags

is 0.4 of a year less than at the close of 1951.

The new oil proved up during 1952 was 689,606,000 barrels less than that added in 1951 from the previous year. In 1951 the nation added 5,137,945,000 barrels to its proved crude and natural gas liquid reserves figure—the single greatest upsurge in the country's history.

However, U. S. production last year was so large that only 1,900,968,000 barrels of the newly proved oils could be added to reserves.

Bulk of U. S. reserves is in crude. At the close of 1952, crude reserves amounted to 29,020,601,000 barrels; natural gas liquids (condensate, natural gasoline, and liquefied petroleum gases) totaled 5,073,000,000 barrels.

Reserves proved during the year 1952 consisted of 3,814,839,000 barrels of crude and 633,500,000 barrels of natural gas liquids.

Texas accounted for almost half of the total crude reserves proved in the nation last year—1,764,450,000 barrels, or 45.9 percent of the nation's figure. This reserve figure exceeded by 749,879,000 barrels the state's 1952 production for the year, allowing an increase in remaining reserves to boost the total to 16,064,843,000 barrels, or 55.4 percent of the nation's total, at the close of the year.

California again ran second in the nation with estimated proved reserves at the close of 1952 of 3,837,409,000 barrels, which, at the state's 1952 producing rate of 359,346,000 barrels, gave it a ratio of year-end reserves to year's production of 10.7 years, 5.1 years lower than the ratio recorded by Texas. California was also second in the nation for 1952 in proving up new crude reserves, with 435,885,000 barrels. Its production and new-found reserves for the year allowed an increase of 76,539,000 barrels to its estimated proved crude reserve figure. That shoved its total reserves to 3,837,409,000 barrels at the end of 1952.

Estimated Proved U. S. Reserves of Crude Oil, Natural Gas Liquids and Total Hydrocarbons, By States

(Sources: Crude Oil from American Petroleum Institute, natural gas liquids from API and American Gas Association)

(THOUSANDS OF BARRELS)

	Proved Reserves as of Dec. 31, 1950	Changes in Proved Reserves Due to Extensions (New Crude Oil) and Revisions During 1951	[1]Proved Reserves Discovered in New Fields and in New Pools in Old Fields in 1951	Production During 1951	Proved Reserves as of Dec. 31, 1951 (Columns 1 + 2 + 3 Less Column 4)	Changes in Reserves During 1951 (Column 5 Less Column 1)
	(1)	(2)	(3)	(4)	(5)	(6)
Crude Oil						
Alabama	5,396	3,495	.....	1,031	7,860	2,464
Arkansas	341,709	20,402	2,397	28,050	336,458	(—) 5,251
California[2]	3,733,562	374,710	7,159	354,561	3,760,870	27,308
Colorado	339,529	11,505	1,945	27,801	325,178	(—) 14,351
Illinois	564,218	140,130	3,782	61,795	646,335	82,117
Indiana	57,372	2,501	1,415	10,621	50,667	(—) 6,705
Kansas	732,187	129,105	44,748	114,094	791,946	59,759
Kentucky	55,871	12,276	665	10,263	58,549	2,678
Louisiana[2]	2,185,137	271,519	49,662	221,537	2,284,781	99,644
Michigan	78,717	(—) 2,576	2,022	14,050	64,113	(—) 14,604
Mississippi	385,705	31,121	4,103	35,542	385,387	(—) 318
Montana	111,272	3,900	2,360	9,114	108,418	(—) 2,854
Nebraska	9,700	4,731	4,250	2,763	15,918	6,218
New Mexico	591,982	63,788	9,504	53,634	611,640	19,658
New York	58,808	2,500	.....	4,247	57,061	(—) 1,747
Ohio	27,264	2,313	.....	3,141	26,436	(—) 828
Oklahoma	1,396,913	234,888	29,781	185,125	1,476,457	79,544
Pennsylvania	106,360	.....	.....	11,358	95,002	(—) 11,358
Texas[2]	13,581,642	2,532,377	192,858	991,913	15,314,964	1,733,322
Utah	21,629	3,000	6,400	1,346	29,683	8,054
West Virginia	39,042	2,000	420	2,700	38,762	(—) 280
Wyoming	841,016	180,614	20,785	68,975	973,440	132,424
Miscellaneous[3]	3,367	399	5,000	660	8,106	4,739
Total United States	25,268,398	4,024,698	389,256	2,214,321	27,468,031	2,199,633
Natural Gas Liquids[4]						
Alabama[5]	.....	.....	.....	.....	.....	.....
Arkansas	52,938	(—) 110	80	1,858	51,050	(—) 1,888
California[2]	363,387	(—) 4,596	.....	29,475	329,316	(—) 34,071
Colorado	12,921	(—) 521	.....	490	11,910	(—) 1,011
Illinois	26,259	2,006	28	3,721	24,572	(—) 1,687
Indiana	152	13	17	33	149	(—) 3
Kansas	163,578	(—) 14	330	4,325	159,569	(—) 4,009
Kentucky	11,927	369	185	2,003	10,478	(—) 1,449
Louisiana[2]	643,512	64,775	9,294	32,808	684,773	41,261
Michigan	1,018	89	1	99	1,009	(—) 9
Mississippi	55,897	47	995	4,649	52,290	(—) 3,607
Montana	3,547	79	.....	285	3,341	(—) 206
Nebraska	235	1,808	686	123	2,586	2,351
New Mexico	93,897	44,221	661	8,160	130,619	36,722
Ohio	1,688	94	11	83	1,710	22
Oklahoma	279,903	52,715	4,319	25,812	311,125	31,222
Pennsylvania	2,599	119	59	214	2,563	(—) 36
Texas[2]	2,496,039	470,160	55,702	144,560	2,877,341	381,302
Utah	194	(—) 128	.....	5	61	(—) 133
West Virginia	8,976	20,845	282	6,182	23,921	14,945
Wyoming	48,987	(—) 3,478	2,543	2,166	45,886	(—) 3,101
Miscellaneous[6]	9	4	321	—	333	324
Total United States	4,267,663	648,497	75,494	267,052	4,724,602	456,939
Total Liquid Hydrocarbons[7]						
Alabama[8]	5,396	3,495	.....	1,031	7,860	2,464
Arkansas	394,647	20,292	2,477	29,908	387,508	(—) 7,139
California[2]	4,096,949	370,114	7,159	384,036	4,090,186	(—) 6,763
Colorado	352,450	10,984	1,945	28,291	337,088	(—) 15,362
Illinois	590,477	142,136	3,810	65,516	670,907	80,430
Indiana	57,524	2,514	1,432	10,654	50,816	(—) 6,708
Kansas	895,765	129,091	45,078	118,419	951,515	55,750
Kentucky	67,798	12,645	850	12,266	69,027	1,229
Louisiana[2]	2,828,649	336,294	58,956	254,345	2,969,554	140,905
Michigan	79,735	(—) 2,487	2,023	14,149	65,122	(—) 14,613
Mississippi	441,602	31,168	5,098	40,191	437,677	(—) 3,925
Montana	114,819	3,979	2,360	9,399	111,759	(—) 3,060
Nebraska	9,935	6,539	4,916	2,886	18,504	8,569
New Mexico	685,879	108,009	10,165	61,794	742,259	56,380
New York[8]	58,808	2,500	.....	4,247	57,061	(—) 1,747
Ohio	28,952	2,407	11	3,224	28,146	(—) 806
Oklahoma	1,676,816	287,603	34,100	210,937	1,787,582	110,766
Pennsylvania	108,959	119	59	11,572	97,565	(—) 11,394
Texas[2]	16,077,681	3,002,537	248,560	1,136,473	18,192,305	2,114,624
Utah	21,823	2,872	6,400	1,351	29,744	7,921
West Virginia	48,018	22,845	702	8,882	62,683	14,665
Wyoming	890,003	177,136	23,328	71,141	1,019,326	129,323
Miscellaneous[9]	3,376	403	5,321	661	8,439	5,063
Total United States	29,536,061	4,673,195	464,750	2,481,373	32,192,633	2,656,572

[1] Only a limited area is assigned to each new discovery, even though the committee may believe that eventually a much larger area will produce; for, in the report, the concern is only with actually proved reserves.
[2] Includes off-shore reserves.
[3] Under Miscellaneous are included crude oil data for Florida, Missouri, North Dakota, Tennessee and Virginia
[4] Natural gas liquids include condensate, natural gasoline, and liquefied petroleum gases.
[5] Included below in Miscellaneous.
[6] Under Miscellaneous are included natural gas liquids for Alabama, Florida, and North Dakota.
[7] Total liquid hydrocarbons includes crude oil and natural gas liquids (condensate, natural gas liquids, and liquefied petroleum gases).
[8] Crude oil only.
[9] Includes Alabama natural gas liquids; Missouri, Tennessee, and Virginia crude; and Florida and North Dakota crude and natural gas liquids.

Estimated Proved Reserves of Crude Oil, Natural Gas Liquids, and Total Liquid Hydrocarbons in the United States, by Years

(Sources: Crude oil by American Petroleum Institute; natural gas liquids and total liquid hydrocarbons by API and American Gas Association. Reserves at end of 1936 and for subsequent years estimated by committees on reserves; earlier data estimated by API department of statistics but not based on geological surveys. Data for latest year estimated by WORLD OIL.)

(THOUSANDS OF BARRELS)

YEAR	Estimated Proved Reserves Beginning of Year	CHANGES IN RESERVES DURING YEAR							Estimated Proved Reserves at End of Year (Col. 1+ Col. 8)	Ratio of Year-End Reserves to Year's Prod. (Year's Supply) (Col. 9÷ Col. 7)
		(ADDITION) RESERVES PROVED DURING YEAR					(Deduction) *Production During Year	(Net Change) Increase or Decrease (Col. 6— Col. 7)		
		Revisions of Previous Estimates	Extensions to Old Pools	Total Revisions and Extensions (Col. 2+3)	New Pools Discovered During Year	Total Reserves Proved During Year (Cols. 4+5)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crude Oil (Incl. Cycle Plant and Lease Condensate)										
1857-1899	0	.....	.....	.....	.....	†3,439,984	†939,984	†+2,500,000	2,500,000	‡43.8
1900	2,500,000	.....	.....	.....	.....	463,621	63,621	+ 400,000	2,900,000	45.6
1901	2,900,000	.....	.....	.....	.....	169,389	69,389	+ 100,000	3,000,000	43.2
1902	3,000,000	.....	.....	.....	.....	288,767	88,767	+ 200,000	3,200,000	36.0
1903	3,200,000	.....	.....	.....	.....	300,461	100,461	+ 200,000	3,400,000	33.8
1904	3,400,000	.....	.....	.....	.....	317,081	117,081	+ 200,000	3,600,000	30.7
1905	3,600,000	.....	.....	.....	.....	334,717	134,717	+ 200,000	3,800,000	28.2
1906	3,800,000	.....	.....	.....	.....	126,494	126,494	.....	3,800,000	30.0
1907	3,800,000	.....	.....	.....	.....	266,095	166,095	+ 100,000	3,900,000	23.5
1908	3,900,000	.....	.....	.....	.....	278,527	178,527	+ 100,000	4,000,000	22.4
1909	4,000,000	.....	.....	.....	.....	383,171	183,171	+ 200,000	4,200,000	22.9
1910	4,200,000	.....	.....	.....	.....	509,557	209,557	+ 300,000	4,500,000	21.5
1911	4,500,000	.....	.....	.....	.....	720,449	220,449	+ 500,000	5,000,000	22.7
1912	5,000,000	.....	.....	.....	.....	622,935	222,935	+ 400,000	5,400,000	23.8
1913	5,400,000	.....	.....	.....	.....	348,446	284,466	+ 100,000	5,500,000	22.1
1914	5,500,000	.....	.....	.....	.....	165,763	265,763	— 100,000	5,400,000	19.9
1915	5,400,000	.....	.....	.....	.....	381,104	281,104	+ 100,000	5,500,000	19.6
1916	5,500,000	.....	.....	.....	.....	700,767	300,767	+ 400,000	5,900,000	19.6
1917	5,900,000	.....	.....	.....	.....	335,316	335,316	.....	5,900,000	17.6
1918	5,900,000	.....	.....	.....	.....	655,928	355,928	+ 300,000	6,200,000	17.4
1919	6,200,000	.....	.....	.....	.....	878,367	378,367	+ 500,000	6,700,000	17.7
1920	6,700,000	.....	.....	.....	.....	942,929	442,929	+ 500,000	7,200,000	16.3
1921	7,200,000	.....	.....	.....	.....	1,072,183	472,183	+ 600,000	7,800,000	16.5
1922	7,800,000	.....	.....	.....	.....	357,531	557,531	— 200,000	7,600,000	13.6
1923	7,600,000	.....	.....	.....	.....	732,407	732,407	.....	7,600,000	10.4
1924	7,600,000	.....	.....	.....	.....	613,940	713,940	— 100,000	7,500,000	10.5
1925	7,500,000	.....	.....	.....	.....	1,763,743	763,743	+1,000,000	8,500,000	11.1
1926	8,500,000	.....	.....	.....	.....	1,070,874	770,874	+ 300,000	8,800,000	11.4
1927	8,800,000	.....	.....	.....	.....	2,601,129	901,129	+1,700,000	10,500,000	11.7
1928	10,500,000	.....	.....	.....	.....	1,401,474	901,474	+ 500,000	11,000,000	12.2
1929	11,000,000	.....	.....	.....	.....	3,207,323	1,007,323	+2,200,000	13,200,000	13.1
1930	13,200,000	.....	.....	.....	.....	1,298,011	898,011	+ 400,000	13,600,000	15.1
1931	13,600,000	.....	.....	.....	.....	251,081	851,081	— 600,000	13,000,000	15.3
1932	13,000,000	.....	.....	.....	.....	85,159	785,159	— 700,000	12,300,000	15.7
1933	12,300,000	.....	.....	.....	.....	605,656	905,656	— 300,000	12,000,000	13.3
1934	12,000,000	.....	.....	.....	.....	1,085,065	908,065	+ 177,000	12,177,000	13.4
1935	12,177,000	.....	.....	.....	.....	1,219,596	996,596	+ 233,000	12,400,000	12.4
1936	12,400,000	.....	.....	.....	.....	1,763,087	1,099,687	+ 663,400	13,063,400	11.9
1937	13,063,400	.....	.....	2,792,790	928,742	3,721,532	1,277,664	+2,433,868	15,507,268	12.1
1938	15,507,268	.....	.....	2,243,571	810,493	3,054,064	1,213,186	+1,840,878	17,348,146	14.3
1939	17,348,146	.....	.....	2,058,455	340,667	2,399,122	1,264,256	+1,134,866	18,483,012	14.6
1940	18,483,012	.....	.....	1,607,012	286,338	1,893,350	1,351,847	+ 541,503	19,024,515	14.1
1941	19,024,515	.....	.....	1,538,989	429,974	1,968,963	1,404,182	+ 564,781	19,589,296	13.9
1942	19,589,296	.....	.....	1,612,925	260,051	1,878,976	1,385,479	+ 493,497	20,082,793	14.5
1943	20,082,793	.....	.....	1,202,368	282,418	1,484,786	1,503,427	— 18,641	20,064,152	13.3
1944	20,064,152	.....	.....	1,556,192	511,308	2,067,500	1,678,421	+ 389,079	20,453,231	12.2
1945	20,453,231	+ 248,891	1,441,424	1,690,315	419,984	2,110,299	1,736,717	+ 373,582	20,826,813	12.0
Crude Oil Only:										
1945	19,784,530	.....	.....	.....	.....	1,870,971	1,713,655	+ 157,316	19,941,846	11.6
1946	19,941,846	+1,254,705	1,158,923	2,413,628	244,434	2,658,062	1,726,348	+ 931,714	20,873,560	12.1
1947	20,873,560	+ 749,278	1,269,862	2,019,140	445,430	2,464,570	1,850,445	+ 614,125	21,487,685	11.6
1948	21,487,685	+1,958,853	1,439,873	3,398,726	396,481	3,795,207	2,002,448	+1,792,759	23,280,444	11.6
1949	23,280,444	+ 603,566	1,693,862	2,297,428	890,417	3,187,845	1,818,800	+1,369,045	24,649,489	13.6
1950	24,649,489	+ 663,378	1,334,391	1,997,769	564,916	2,562,685	1,943,776	+ 618,909	25,268,398	13.0
1951	25,268,328	+1,776,110	2,248,588	4,024,698	389,256	4,413,954	2,214,321	+2,199,633	27,468,031	12.4
§1952	27,468,031	.....	.....	.....	.....	3,814,839	‡2,262,269	+1,552,570	29,020,601	12.8
Natural Gas Liquids (Condensate, Natural Gasoline, Liquefied Petroleum Gases):										
1946	.....	.....	.....	.....	.....	.....	.....	.....	3,163,219	.....
1947	3,163,219	.....	.....	192,237	59,301	251,538	160,782	+ 90,756	3,253,975	20.2
1948	3,253,975	.....	.....	405,874	64,683	470,557	183,749	+ 286,808	3,540,783	19.3
1949	3,540,783	.....	.....	294,211	92,565	386,776	198,547	+ 188,229	3,729,012	18.8
1950	3,729,012	.....	.....	707,879	58,183	766,062	227,411	+ 538,651	4,267,663	18.8
1951	4,267,663	.....	.....	648,497	75,494	723,991	267,052	+ 456,939	4,724,602	17.7
§1952	4,724,602	.....	.....	.....	.....	633,500	*285,102	+ 348,398	5,073,000	17.8
Total Liquid Hydrocarbons:										
1946	.....	.....	.....	.....	.....	.....	.....	.....	24,036,779	.....
1947	24,036,779	.....	.....	2,211,377	564,731	2,716,108	2,011,227	+ 704,881	24,741,660	12.3
1948	24,741,660	.....	.....	3,804,600	461,164	4,265,764	2,186,197	+2,079,567	26,821,227	12.3
1949	26,821,227	.....	.....	2,591,639	982,982	3,574,621	2,017,347	+1,557,274	28,378,501	14.1
1950	28,378,501	.....	.....	2,705,648	623,099	3,328,747	2,171,187	+1,157,560	29,536,061	13.6
1951	29,536,061	.....	.....	4,673,195	464,750	5,137,945	2,481,373	+5,137,945	32,192,633	13.0
§1952	32,192,633	.....	.....	.....	.....	4,448,339	2,547,371	+1,900,968	34,093,601	13.4

* Production for 1936 and previous years from U. S. Bureau of Mines: production for 1937 and each subsequent year compiled by API (and AGA) committees on basis of 11 months actual and December estimated. Small variance of these figures from actual production as later reported is compensated by revision when reserves report for succeeding year is compiled.

† During years 1857-1899. ‡ Based on production of 57,071 thousand barrels in 1899. § Estimated by WORLD OIL. ‡ Crude oil only, not including 31,747 lease condensate fed into pipe lines with crude oil. * Includes 220,855 plant production of natural gasoline, etc; 31,747 lease condensate; estimated 32,500 loses and waste.

Overloads are automatically by-passed and the flexible rubber fins allow the E-Z Swab to pass smoothly through tight spots on both the up and down strokes.

Since each Mission E-Z Swab rubber will lift approximately 400 feet of fluid, you can select the amount of fluid to be lifted before going in the hole by using one, two, or three rubbers.

One type Mission E-Z Swab rubber meets all swabbing needs. That's why Mission E-Z Swabs have set a new standard for fast, easy, successful swabbing under all conditions. Ask your Mission Representative for complete details or write for Bulletin EZ 751. Available through all supply stores.

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HOUSTON, TEXAS

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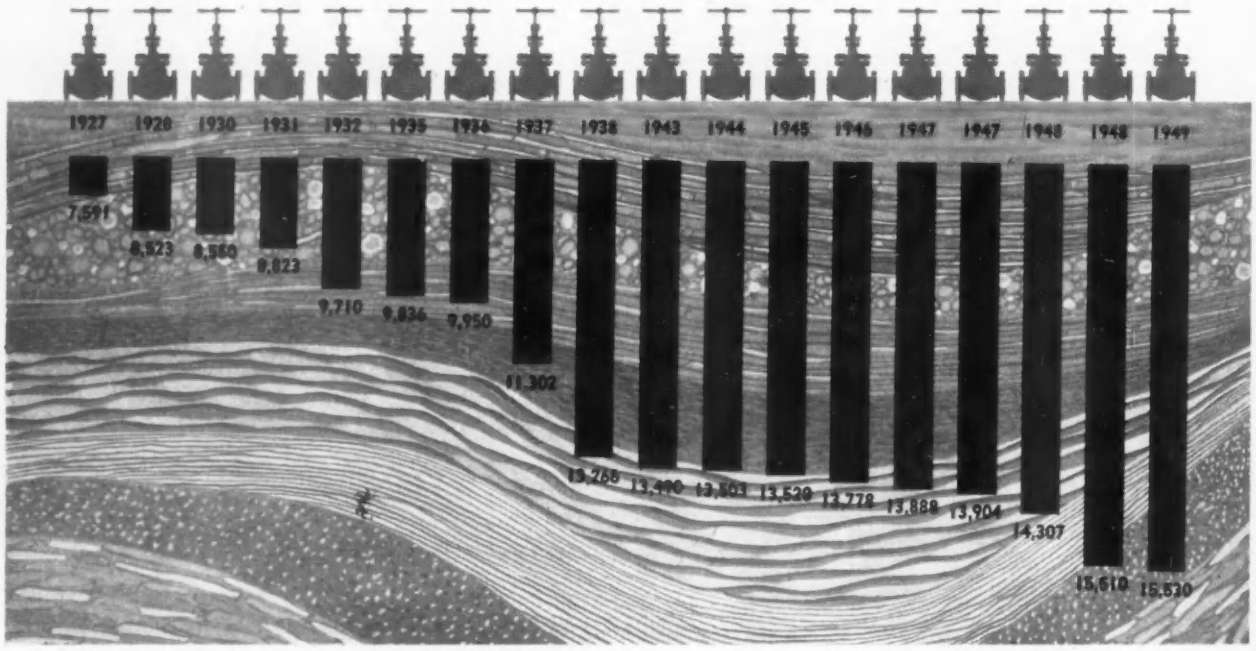
Producing Depth Records

Fall in Ten Areas

DURING 1952, ten area producing depth records were toppled, but the world record remained intact. However, The Texas Company's State C-3, Terrebonne Parish, Louisiana, oil well completed at 15,362 feet as a producer came within 168 feet of equaling Standard Oil Company of California's Mushrush 5, Wasco field, Kern County, California, which began producing at 15,530 feet in 1949.

In 1951, a dozen area producing depth records were broken and another Louisiana well was drilled to within 194 feet of Standard Oil's Kern County well. That well, 1951's deepest oil producer, was Shell Oil Company's H. T. Gonsoulin 1, Weeks Island field, Iberia Parish.

Of the new area marks set during 1952, five, in addition to the Louisiana well, exceeded 10,000 feet in depth. Phillips Petroleum Company's Glenna 1, Pecos County, West Texas,



Year	WELL AND LOCATION	Feet
1927	E. J. Miley's Athens 6, Rosecrans field, California	7,591
1928	Texon Oil and Land Company's University 1-B, Big Lake field, West Texas	8,523
1930	Star Petroleum Company's Colby 2, Long Beach, California	8,550
1931	Tide Water Associated Oil Company's Lloyd 57, Ventura Avenue, California	8,823
1932	Tide Water Associated Oil Company's Lloyd 83, Ventura Avenue, California	9,710
1935	Tide Water Associated Oil Company's Lloyd 131, Ventura Avenue, California	9,836
1936	The Texas Company's Lafitte 5, Lafitte field, Southern Louisiana	9,950
1937	Union Oil Company's Kernco 1-34, Rio Bravo field, Kern County, California	11,302
1938	Fohs Oil Company's Buckley-Bourg 1, DeLarge field, Southern Louisiana	13,266
1943	Union Producing Company's Fitzpatrich-Vizard 1, DeLarge field, Southern Louisiana	13,490
1944	Union Producing Company-Fohs Oil Co.'s Buckley-Bourg 2, DeLarge field, Southern Louisiana	13,503
1945	Shell Oil Company's Smith-State 1, Weeks Island field, Southern Louisiana	13,520
1946	Shell Oil Company's Smith-State 2, Weeks Island field, Southern Louisiana	13,778
1947	Shell Oil Company's Smith-State 3, Weeks Island field, Southern Louisiana	13,888
1947	The Texas Company's LaFourche Basin Levee Dist. 1, Queen Bess Island field, Southern Louisiana	13,904
1948	Pure Oil Company's Unit 1, West Poison Spider field, Wyoming	14,307
1948	Denver Producing and Refining Company's School Land 1-A, Cogar field, Caddo County, Oklahoma	15,510
1949	Standard Oil Company of California's Mushrush 5, Wasco field, Kern County, California	15,530

was a producer from 14,522 feet, displacing the area's previous record depth of 13,310 feet drilled in 1950. In Southeast New Mexico, Buffalo Oil Company's M. E. Baish-Federal 12-B, Maljamar field, Lea County, went to 13,573 feet to erase the previous record of 12,766 feet established in 1951.

Upper Coast Mark

Phillips' Houston "R" 1-A, Chocolate Bayou field, Brazoria County, was drilled to 12,855 feet to displace the previous Upper Texas Coast mark of 12,725 feet, also set in 1951. Utah, whose previous record depth oil producer was drilled to 9392 feet in 1949, boasted a new mark in 1952 of 10,244 feet, set by Phillips & The Carter Oil Company's Peterson Unit E-11, Roosevelt field, Uintah County. Frank Weiner's R. W. Haslip 1, Big Mineral Creek field, Grayson County, was good for a new record in the North Texas area. This well produces from a depth of 10,160 feet to supplant the previous record depth of 8940 feet, which was set in 1946.

Three of the remaining four records were set by producers at the 9000-foot plus level, and one at the 6000-foot plus level. In Montana, The Texas Company's NPRR (NCT 4) G-1, Dawson County, erased that area's previous mark of 9079 feet established in 1951. In North Dakota, the previous record of 8528 feet, set in 1951, was supplanted by Amerada Petroleum Corporation's B. H. Risser, McKenzie County, completed as a producer at 9570 feet. Arkansas' previous record of 9335 feet was set in 1951. It, too, boasted a new 1952 record of 9453 feet on completion of Carter's McKamie-Patton Unit C-216-1, McKamie-Patton field, Lafayette County. Michigan's record, also set in 1951, of 5238 feet was broken by Brazos Oil & Gas Company's State-Chester HE-1, Chester Township, Otsego County, which found oil at 6638 feet.

In the 16 years since production was first found below the 10,000-foot level, the industry has made such strides that nine states now have wells producing below that depth. The 3 deepest are in the 15,000-foot bracket; 2 are in the 14,000-foot group; 2 each in the 13,000 and 11,000-foot division; and 1 is in the 12,000-foot class.

Records New

That the trend is to deep production is indicated by the fact that none of the ten deepest wells were drilled more than five years before 1952. Likewise, 26 of the 37 area marks were made during the five years preceding 1953. Fourteen were set during 1951-1952.

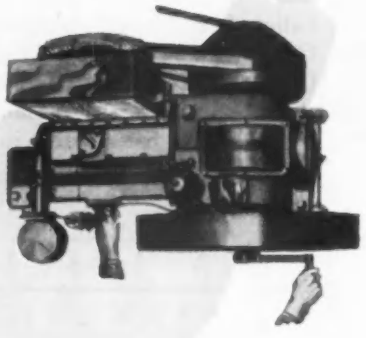
Of the 37 area records, Missouri's mark of 1444 feet set in 1940 by Cities Service Oil Company's Jim Cook 1, Tarkio field, Atchison County, is the shallowest. Oldest record depth again remained Kentucky's 5170 feet, made in 1932 by United Carbon Company's Howe 1, Pike County.

Producing Depth Records in U. S., by States and Districts

State or District	Feet*	Year	Formation	Well, Location, and Type of Production
California	15,530	1949	Eocene	Standard Oil Co. of California's Mushrush 5, Wasco field, Kern County. (Oil) World's Deepest
Oklahoma	15,510	1948	Viola	Denver Producing & Refining Company's School Land 1-A, Cogar field, Caddo County. (Gas)
South Louisiana	15,362	1952	Miocene	The Texas Company's State C-3, in 15-22s-18e, Terrebonne Parish. (Oil)
West Texas	14,522	1952	Ellenburger	Phillips Petroleum Co.'s Glenna 1, Section 28, Block 101, TCRR Survey, Pecos County. (Oil)
Wyoming	14,307	1948	2nd Frontier	Pure Oil Company's Unit 1, West Poison Spider field, Natrona County. (Oil)
New Mexico—S. E.	13,573	1952	Devonian	Buffalo Oil Co.'s M. E. Baish-Federal 12-B, in 2-17s-32e, Maljamar field, Lea County. (Oil)
Mississippi	13,082	1947	Glen Rose	Gulf Refining Company's L. L. Majors 1, West Ovett field, Jones County. (Oil)
Upper Texas Coast	12,855	1952	Anarau	Phillips Petroleum Co.'s Houston "R" 1-A, Chocolate Bayou field, Brazoria County. (Condensate)
Florida	11,588	1948	L. Cretaceous	Humble O&R Co.'s Lee Tidewater Cypress Lumber Co. 1-B, Sunniland field, Collier County (Oil)
Southwest Texas	11,490	1951	Frio	Western Natural Gas Co.'s St. Charles Ranch Co. 14, Blackjack field, Aransas County. (Gas)
North Louisiana	10,864	1949	Smackover "B"	Midstate Oil Corp.'s Lewis-Hearn-Williamson 1, Haynesville Deep field, Claiborne Parish. (Oil)
East Texas	10,312	1942	Pettit	Humble Oil & Refining Company's Curtis 1, Larissa field, Cherokee County. (Oil)
Utah	10,244	1952	Wasatch	Phillips & Carter Oil Company's Peterson Unit E-11, Roosevelt field, Uintah County. (Oil)
North Texas	10,160	1952	.....	Frank Weiner's R. W. Haslip 1, Big Mineral Creek field, Grayson County. (Condensate)
Lower Texas Coast	10,132	1946	Wilcox	Continental Oil Company's Clay-West Burns 2, Clay West field, Live Oak County. (Oil)
Montana	9,948	1952	Ordovician	The Texas Company's NPRR (NCT 4) G-1, in 23-17n-53e, Dawson County. (Oil)
North Dakota	9,570	1952	Madison	Amerada Petroleum Corporation's B. H. Risser, in 12-149n-96w, McKenzie County (Oil)
Arkansas	9,453	1952	Smackover	Carter Oil Co.'s McKamie-Patton Unit C-216-1, McKamie-Patton field, Lafayette County. (Oil)
Colorado	9,435	1950	Paradox	Delhi Oil Corporation's Barker 5, Barker Dome field, La Plata County. (Oil)
South Central Texas	9,018	1946	Edwards	Quintana Petroleum Corporation's C. Muil 3, Muil field, Atascosa County. (Oil)
Texas Panhandle	8,970	1949	Mississippian	Sinclair Oil & Gas Company's C. S. Lips 1, Lips field, Roberts County. (Oil)
New Mexico—N.W.	8,875	1945	Paradox	Southern Union Gas Co.'s Barker-Ute Indian 11, Barker Creek field, San Juan County. (Gas)
West Virginia	8,410	1946	Oriskany	Ohio Oil Company's Kuykendall et al 1, Dry Fork District, Tucker County. (Gas)
Pennsylvania	8,229	1949	Onondaga	Peoples Natural Gas Co.'s William Piper 1, Unity Township, Westmoreland County. (Gas)
Nebraska	7,354	1951	Dakota "J"	Gulf Oil Company's Sisson 1, Sisson field, Kimball County. (Oil)
North Central Texas	7,132	1950	Ellenburger	Sun Oil Company's J. P. Maddox 1, Mary Neal field, Nolan County. (Oil)
Michigan	6,638	1952	Basal Salina	Brazos Oil & Gas Co.'s State-Chester HE-1, Chester Township, Otsego County. (Oil)
Kansas	6,536	1951	Viola	Stanolind O&G Company's Daisy Wall 1, Ashland field, Clark County. (Oil)
Ohio	5,880	1946	Clinton	Frank Lyons' Anita B. Wright 1, Hanover Township, Columbiana County. (Gas)
Alabama	5,425	1951	.....	Humble O&R Co.'s Charles O. Oswell 1, Carlton South field, Baldwin County. (Oil)
New York	5,229	1942	Oriskany	E. Kent Kane's Robert Lewis 1, West Union Township, Steuben County. (Gas)
Kentucky	5,170	1932	Devonian	United Carbon Company's Howe 1, Pike County. (Gas)
Illinois	4,780	1943	Trenton	Kingwood Oil Company's Shanafelt 24-A, Salem fie'd, Marion County. (Oil)
Maryland	4,456	1949	Huntersville	Cumberland & Allegheny Gas Company's Elmer N. Beachy S-424, Garrett County. (Gas)
Indiana	3,011	1946	McClosky	H. E. Ledbetter et al's Nobel Utley 1, Springfield Consolidated field, Posey County. (Oil)
Tennessee	1,790	1948	Knox	Turner Bros. & Shaner's Fred Johnson 1, Forbus field, Fentress County. (Oil)
Missouri	1,444	1940	Bartlesville	Cities Service Oil Company's Jim Cook 1, Tarkio field, Atchison County. (Oil)

*Maximum depth from which production comes.

Only CSCO PUMPING ENGINES Give You These 4 Outstanding Features



Easy and Safe to Start

A flip of the release cam and the flywheel momentum rides through the compression of the combustible mixture. This is possible because the simple hand control cam holds the *inlet valve* open (not exhaust valve), thereby releasing compression. Yet the *combustible mixture* is allowed to charge the cylinder during *free cranking*—an exclusive CSCO feature.

SAFE! Impulse does not trip until after dead center . . . so, *it can't kick back!*

Easy to Service

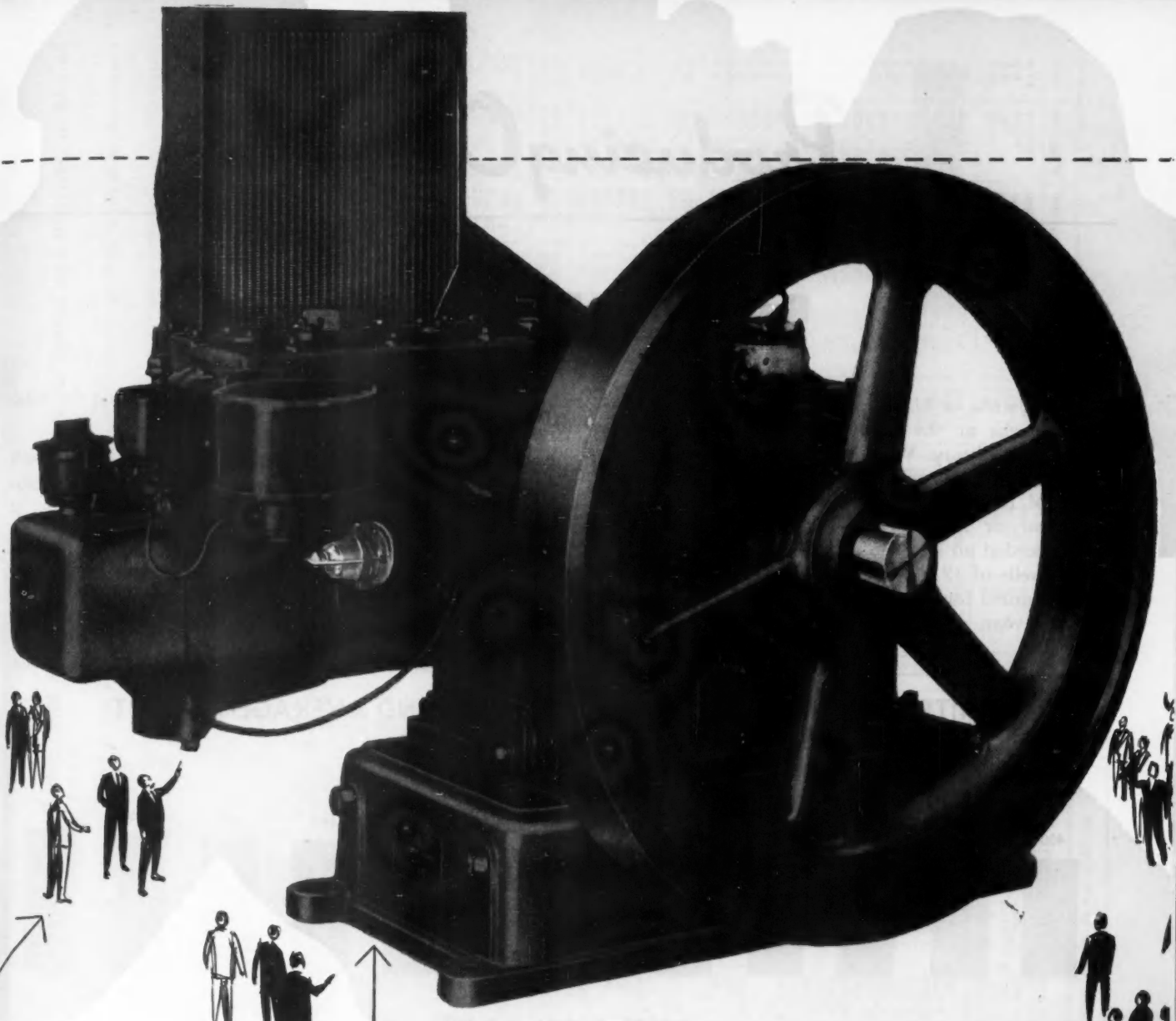
There's no need to stop a CSCO to check oil level . . . to add oil . . . to check water level . . . or to add water. And you can SEE when an oil change is needed, for on a CSCO the oil level is plainly visible at all times. Instant wrenchless access to the crankcase, through the extra large opening, makes oil changing and cleaning out of the oil sump *easy* and *quick*.

Since there's no need to stop, there's no need to restart!

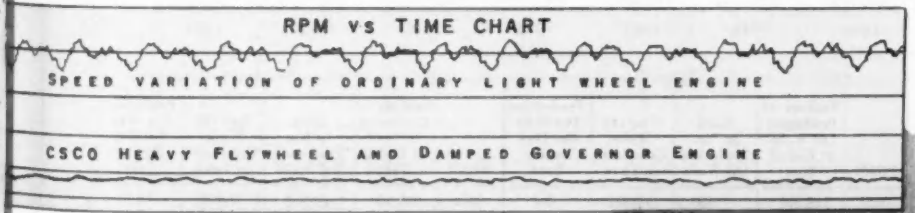
Easy to Repair

CSCO parts needing repair or attention can be removed from the engine with a minimum of disturbance of adjacent parts or assemblies. For CSCO design embodies *unit assemblies*, permitting quick and easy accessibility. For example, the piston and rod assembly is easily removed through the crankcase without draining the water or oil. *No other essential parts are disturbed!*

CONTINENTAL



Smooth Steady Operation



The degree of damping chosen for CSCO Pumping Engines is exactly suited to their extra heavy flywheels. They team up to produce the smoothest running engine on oil well pumping. The flywheel inertia provides the peak power while the oil damped governor holds the throttle steady, thus permitting engine to average the power, *up to its full capacity.*

No need to derate CSCO Engines on oil well pumping!

A DEPENDABLE WORKER ALWAYS SAVES YOU MONEY!

Since a CSCO Pumping Engine is easier to maintain and gives smoother and steadier performance, it is more economical to operate. Costly shut-downs are held to a minimum. In fact, when renewal of a CSCO is desired, all work can be done *on location!* Write or ask your Continental man for a CSCO bulletin and complete details on the full line.

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Producing Oil Wells

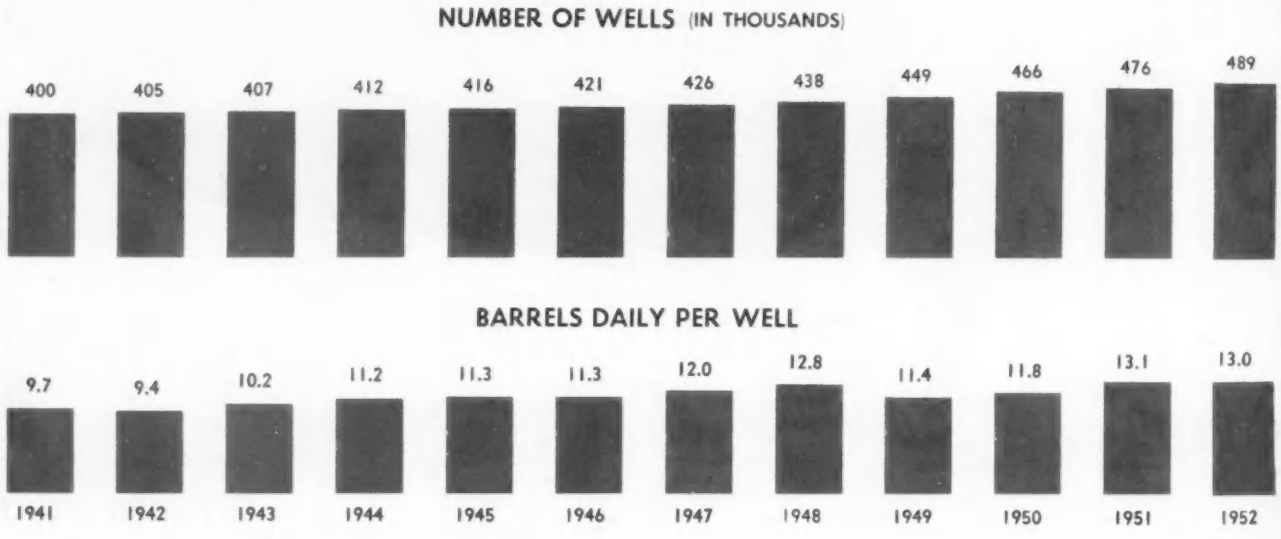
Remain at Record Level

THE NUMBER OF U. S. oil and condensate wells at the close of 1952 again made history. With a total of 492,426 wells, the nation chalked up a gain of 16,089 wells from the previous year, or 3.4 percent. The year 1952 recorded an increase in producing oil wells of 12,545 over the 476,337 accounted for at the close of the previous year. New oil wells completed last year totaled 23,290, a decline of 242, or slightly more than a single percent, from the 23,532 new oil wells completed during the previous year.

Of the increase in producing oil wells, 10,709 were artificial lift, bringing the 1952 number of artificial lift wells for the nation up to 431,533. During last year, 1836 new flowing wells were added, increasing the total for the U. S. to 57,349.

The average daily output per well in 1952 reached 13.3 barrels, as compared with 1951's daily average of 12.9 barrels. Average daily yield for the U. S. in 1952 reached a record 6,469,900 barrels, as compared to 6,089,650 barrels the previous year.

UNITED STATES PRODUCING OIL WELLS AND AVERAGE OUTPUT



YEAR	Number of Producing Oil Wells at End of Year	Gain In No. Producing Oil Wells	New Oil Wells Completed in Year	Production Per Well Per Day During Year
1918	263,375	.....	17,860	...
1919	227,000	23,625	21,041	4.8
1920	251,000	24,000	24,278	5.0
1921	274,500	23,500	14,715	4.9
1922	284,880	10,380	17,790	5.7
1923	290,100	5,220	16,182	6.6
1924	299,100	9,000	14,707	6.2
1925	306,100	7,000	17,029	6.5
1926	318,600	12,500	18,626	6.8
1927	323,300	4,700	14,382	7.7
1928	327,800	4,500	12,348	7.6
1929	328,200	400	15,362	8.4
1930	331,070	2,870	11,693	7.5
1931	315,850	*15,220	7,011	7.2
1932	321,500	5,650	10,530	6.7
1933	326,850	5,350	8,070	7.7
1934	333,070	6,220	13,119	7.5
1935	340,990	7,920	15,418	8.1
1936	349,450	8,460	18,704	8.7
1937	363,030	13,580	23,115	9.8
1938	369,640	6,610	19,106	9.1
1939	380,390	10,750	17,734	9.2
1940	389,010	8,620	19,843	9.6
1941	399,960	10,950	19,590	9.7
1942	404,840	4,880	10,977	9.4
1943	407,170	2,330	9,887	10.2
1944	412,220	5,050	13,502	11.2
1945	415,750	3,530	13,944	11.3
1946	421,460	5,710	16,087	11.3
1947	426,280	4,820	17,613	12.0
1948	437,880	11,600	22,197	12.8
1949	448,680	10,800	21,415	11.4
1950	465,870	17,190	23,775	11.8
1951	476,337	10,467	23,532	13.1
1952	488,882	12,545	23,290	13.0

* Only decrease of recent time, reflecting abandonment or shutting in of many wells when early chaotic development of East Texas field, coupled with business depression, severely depressed crude prices.

SOURCE: Producing well data for 1918-1948 from U. S. Bureau of Mines, with more recent years by WORLD OIL, with cooperation of state conservation officials and others. Completion data since 1920 from records of WORLD OIL (and predecessor, The Oil Weekly), earlier years from Bureau of Mines. Daily average production per well obtained by dividing daily average production of nation for year by average number of wells producing during year, that is, between January 1 and December 31.

Active Producing Crude Oil and Condensate Wells in U. S., Methods of Producing, and Average Output Per Well, by States and Districts, at End of 1951 and 1952

Data represent only active crude oil and condensate producing wells, including no inactive or shut-in wells and no gas wells. Compiled by WORLD OIL, with cooperation of state conservation departments and other sources.

STATE or DISTRICT	CONDENSATE WELLS						CRUDE OIL WELLS										TOTAL CRUDE OIL AND CONDENSATE WELLS					
	End of 1951			End of 1952			Flowing		Artificial Lift		Total Crude Oil Wells						End of 1951			End of 1952		
		Bbls. Daily Production			Bbls. Daily Production						End of 1951			End of 1952			Bbls. Daily Production			Bbls. Daily Production		
	Wells	Total	Per Well	Wells	Total	Per Well	End of 1951	End of 1952	End of 1951	End of 1952	Wells	Total	Per Well	Wells	Total	Per Well	Wells	Total	Per Well	Wells	Total	Per Well
Alabama	.....	.....	.....	.....	.....	.....	.....	4	75	92	75	2,800	37.3	96	3,450	35.9	75	2,800	37.3	96	3,450	35.9
Arkansas	77	5,350	69.5	68	650	9.6	312	350	3,329	3,578	3,641	75,450	20.7	3,928	76,300	19.4	3,718	80,800	21.7	3,996	76,950	19.3
California	53	2,450	46.2	70	2,500	35.7	1,934	1,886	27,656	29,005	29,590	975,050	33.0	30,871	988,000	32.0	29,643	977,500	33.0	30,941	990,500	32.0
San Joaquin Valley	53	2,450	46.2	70	2,500	35.7	1,060	1,070	14,642	15,176	15,702	419,150	26.7	16,246	413,500	25.5	15,755	421,600	26.8	16,316	416,000	25.5
Coastal District	.....	.....	.....	.....	.....	.....	618	598	3,519	3,997	4,137	217,000	52.5	4,595	238,700	51.9	4,137	217,000	52.5	4,595	238,700	51.9
Los Angeles Basin	.....	.....	.....	.....	.....	.....	256	198	9,495	9,832	9,751	338,900	34.8	10,030	335,800	33.5	9,751	338,900	34.8	10,030	335,800	33.5
Colorado	.....	.....	.....	.....	.....	.....	135	85	700	886	835	76,200	91.3	971	88,800	91.5	835	76,200	91.3	971	88,800	91.5
Florida	.....	.....	.....	.....	.....	.....	1	1	11	11	12	1,700	141.7	12	1,550	129.2	12	1,700	141.7	12	1,550	129.2
Illinois	.....	.....	.....	.....	.....	.....	12	7	32,873	33,727	32,885	150,400	4.6	33,734	170,450	5.1	32,885	150,400	4.6	33,734	170,450	5.1
Indiana	.....	.....	.....	.....	.....	.....	18	22	4,222	4,473	4,240	29,900	7.1	4,495	33,300	7.4	4,240	29,900	7.1	4,495	33,300	7.4
Kansas	.....	.....	.....	.....	.....	.....	45	58	31,215	32,018	31,260	313,800	10.0	32,076	309,900	9.7	31,260	313,800	10.0	32,076	309,900	9.7
Kentucky	.....	.....	.....	.....	.....	.....	36	.....	15,524	15,806	15,560	33,800	2.2	15,806	30,900	2.0	15,560	33,800	2.2	15,806	30,900	2.0
Louisiana	1,057	36,400	34.4	1,244	34,350	27.6	3,417	3,591	8,106	8,770	11,523	602,000	52.2	12,361	651,200	52.7	12,580	638,400	50.7	13,605	685,550	50.4
North Louisiana	442	13,250	30.0	461	2,500	5.4	420	424	6,564	6,867	6,984	104,350	14.9	7,291	111,000	15.2	7,426	117,600	15.8	7,752	113,500	14.6
South Louisiana	615	23,150	37.6	783	31,850	40.7	2,997	3,167	1,542	1,903	4,539	497,650	109.6	5,070	540,200	106.5	5,154	520,800	101.0	5,853	572,050	97.7
Michigan	.....	.....	.....	.....	.....	.....	155	134	3,730	3,858	3,885	35,200	9.1	3,992	34,500	8.6	3,885	35,200	9.1	3,992	34,500	8.6
Mississippi	144	4,400	30.6	128	4,050	31.6	126	206	1,466	1,504	1,592	95,600	60.1	1,710	91,800	53.7	1,736	100,000	57.6	1,838	95,850	52.1
Missouri	.....	.....	.....	.....	.....	.....	.....	.....	43	70	43	50	1.2	70	50	0.7	43	50	1.2	70	50	0.7
Montana	11	.....	.....	8	.....	.....	22	30	3,188	3,286	3,210	23,000	7.2	3,316	29,900	9.0	3,221	23,000	7.1	3,324	29,900	9.0
Nebraska	.....	.....	.....	.....	.....	.....	27	32	181	278	208	5,500	26.4	310	8,900	28.7	208	5,500	26.4	310	8,900	28.7
New Mexico	49	.....	.....	55	400	7.3	3,283	3,462	2,768	3,141	6,051	150,900	24.9	6,603	173,200	26.2	6,100	150,900	24.7	6,658	173,600	26.1
Northwest New Mexico	38	.....	.....	38	.....	.....	.....	.....	39	70	39	600	15.4	70	1,600	22.9	77	600	7.8	108	1,600	14.8
Southeast New Mexico	11	.....	.....	17	400	23.5	3,283	3,462	2,729	3,071	6,012	150,300	25.0	6,533	171,600	26.3	6,023	150,300	25.0	6,550	172,000	26.3
New York	.....	.....	.....	.....	.....	.....	.....	.....	23,100	23,300	23,100	11,000	0.5	23,300	12,950	0.6	23,100	11,000	0.5	23,300	12,950	0.6
North Dakota	.....	.....	.....	.....	.....	.....	2	68	.....	17	2	100	50.0	85	10,200	120.0	2	100	50.0	85	10,200	120.0
Ohio	.....	.....	.....	.....	.....	.....	50	40	18,450	18,460	18,500	6,800	0.4	18,500	9,000	0.5	18,500	6,800	0.4	18,500	9,000	0.5
Oklahoma	.....	.....	.....	.....	.....	.....	1,605	1,485	56,715	58,762	58,320	524,900	9.0	60,247	537,850	8.9	58,320	524,900	9.0	60,247	537,850	8.9
Pennsylvania	.....	.....	.....	.....	.....	.....	.....	.....	81,200	81,200	81,200	24,800	0.3	81,200	28,050	0.3	81,200	24,800	0.3	81,200	28,050	0.3
Tennessee	.....	.....	.....	.....	.....	.....	.....	.....	34	35	34	50	1.5	35	50	1.4	34	50	1.5	35	50	1.4
*Texas	1,753	43,150	24.6	1,947	44,950	23.1	44,016	45,656	86,293	90,366	130,309	2,761,450	21.2	136,022	2,961,600	21.8	132,062	2,804,600	21.2	137,969	3,006,550	21.8
Dist. 1: South Central	19	200	10.5	19	200	10.5	245	246	3,722	3,883	3,967	32,700	8.2	4,129	38,600	9.3	3,986	32,900	8.3	4,148	38,800	9.4
Dist. 2: Middle Gulf	326	3,250	10.0	379	4,550	12.0	3,187	3,251	1,397	1,505	4,584	163,050	35.6	4,756	169,750	35.7	4,910	166,300	33.9	5,135	174,300	33.9
Dist. 3: Upper Gulf	614	24,150	39.3	661	24,950	37.7	5,055	5,142	5,438	5,762	10,493	461,750	44.0	10,904	484,500	44.4	11,107	485,900	43.7	11,565	509,450	44.1
Dist. 4: L. Gulf-S.W.	240	4,550	19.0	273	5,250	19.2	4,837	5,122	5,954	6,110	10,791	251,700	23.3	11,232	267,750	23.8	11,031	256,250	23.2	11,505	273,000	23.7
Dist. 5: East Central	56	250	4.5	54	200	3.7	528	526	1,684	1,661	2,212	52,600	23.8	2,187	54,850	25.1	2,268	52,850	23.3	2,241	55,050	24.6
Dist. 6: E. Texas Field	.....	.....	.....	.....	.....	.....	11,858	11,633	9,549	9,463	21,407	268,800	12.6	21,096	265,000	12.6	21,407	268,800	12.6	21,096	265,000	12.6
Dist. 6: Northeast	317	3,500	11.0	351	4,000	11.4	1,135	1,126	2,214	2,268	3,349	122,800	36.7	3,394	133,600	39.4	3,666	126,300	34.5	3,745	137,600	36.7
Dist. 7-B: N. Central	38	100	2.6	48	50	1.0	1,583	1,805	7,856	8,268	9,439	84,250	8.9	10,073	117,950	11.7	9,477	84,350	8.9	10,121	118,000	11.7
Dist. 7-C: W. Central	75	6,700	89.3	72	5,300	73.6	1,323	1,989	2,176	2,473	3,499	116,400	33.3	4,462	170,200	38.1	3,574	123,100	34.4	4,534	175,500	38.7
Dist. 8: West	36	350	9.7	35	200	5.7	12,969	13,312	17,355	18,994	30,324	956,400	31.5	32,306	988,950	30.6	30,360	956,750	31.5	32,341	989,150	30.6
Dist. 9: North	30	100	3.3	51	200	3.9	1,273	1,471	21,231	22,024	22,504	157,950	7.0	23,495	189,800	8.1	22,534	158,050	7.0	23,546	190,000	8.1
Dist. 10: Panhandle	2	.....	.....	4	50	12.5	23	33	7,717	7,955	7,740	83,550	10.8	7,988	80,650	10.1	7,742	83,550	10.8	7,992	80,700	10.1
Utah	.....	.....	.....	.....	.....	.....	4	10	38	51	42	4,850	115.5	61	5,250	86.1	42	4,850	115.5	61	5,250	86.1
Virginia	.....	.....	.....	.....	.....	.....	.....	.....	15	25	15	50	3.3	25	100	4.0	15	50	3.3	25	100	4.0
West Virginia	.....	.....	.....	.....	.....	.....	.....	.....	14,600	14,200	14,600	6,800	0.5	14,200	6,750	0.5	14,600	6,800	0.5	14,200	6,750	0.5
Wyoming	21	800	38.1	24	950	39.6	313	242	5,292	4,614	5,605	177,500	31.7	4,856	205,900	42.4	5,626	178,300	31.7	4,880	206,850	42.4
Total United States	3,165	92,550	29.2	3,544	87,850	24.8	55,513	57,349	420,824	431,533	476,337	6,089,650	12.8	488,882	6,469,900	13.2	479,502	6,182,200	12.9	492,426	6,557,750	13.3

* Texas production by district from A.P.I. and different slightly from state total, which is from Bureau of Mines.

Refinery Operations

Equal to Maximum Demands

REFINERY CAPACITY continued its record expansion in 1952 and crude runs to stills kept pace with a daily average of 6,666,700 barrels.

Neither the gain in crude runs to stills nor refinery capacity was so great as in the previous year, but it came in the face of an expectedly tight materials situation, a serious strike, and despite the sobering threat of excessive stocks.

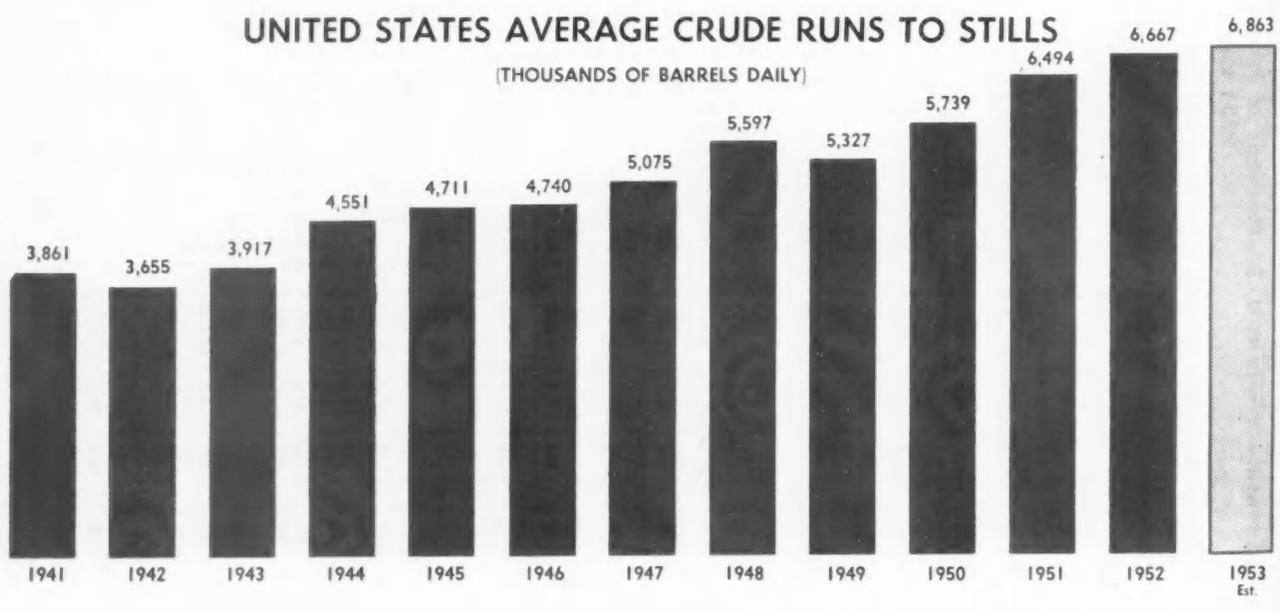
Refinery capacity had climbed to 7,585,000 barrels daily in late 1952, which was 356,000 barrels greater than at the end of 1951. Runs to stills had registered a gain of 172,400 barrels in December over the year-ago figure.

In contrast to the situation a year ago, when tight materials supply situation indicated but little increase in capacity during 1952, there is evidence that refining capacity will climb above 8 million barrels this year, with runs to stills averaging in the neighborhood of 7 million barrels.

This means the U. S. will have sufficient capacity to meet maximum demands, with enough left over at present and anticipated consumption level to pose the problem of excessive stocks in certain categories.

Output of refinery gasoline (straight runs, cracked and natural blended at refineries) totaled 1,050,-187,000 barrels during the past year, or 2,869,000 per day. This was a gain of 4 percent over 1951.

Distillate fuel oils registered a sharp



(All Figures in Barrels)

YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average
1918	326,025,000	893,200	1927	828,835,000	2,270,800	1936	1,068,570,000	2,919,000	1945	1,719,534,000	4,711,000
1919	361,520,000	990,500	1928	913,295,000	2,295,300	1937	1,183,440,000	3,242,000	1946	1,730,197,000	4,740,000
1920	433,915,000	1,185,600	1929	987,708,000	2,706,100	1938	1,165,015,000	3,191,800	1947	1,852,246,000	5,074,600
1921	443,363,000	1,214,700	1930	927,447,000	2,541,000	1939	1,237,840,000	3,391,000	1948	2,048,349,000	5,596,600
1922	500,706,000	1,371,800	1931	894,608,000	2,451,000	1940	1,294,283,000	3,536,300	1949	5,944,221,000	5,326,600
1923	581,238,000	1,592,400	1932	819,997,000	2,240,400	1941	1,409,192,000	3,860,800	1950	2,094,867,000	5,739,400
1924	643,719,000	1,758,800	1933	861,254,000	2,359,600	1942	1,334,103,000	4,655,000	1951	2,370,404,000	6,494,300
1925	739,920,000	2,027,200	1934	895,636,000	2,453,800	1943	1,429,738,000	3,917,000	1952	2,440,003,000	6,666,700
1926	779,264,000	2,135,000	1935	965,790,000	2,646,000	1944	1,665,684,000	4,551,000	1953 Est.	2,504,995,000	6,863,000

Source: U. S. Bureau of Mines, except 1952, which has been calculated from Bureau of Mines for first 10 months and American Petroleum Institute weekly reports for last two months.

advance for the third consecutive year, moving up 9.7 percent to 522,077,000 barrels.

Lubricants declined a rather sharp 8.6 percent to 56,212,000 barrels from the year before's record total of 61,489,000 barrels, which had been a 20.2 percent increase above 1950.

Residuals and kerosine also slipped back after scoring marked increases the previous year. Residual production for the year was 452,615,000 barrels, a 3.6 decline, and kerosine output was 132,331,000, down 2.5 percent.

The largest percentage gain over 1951 was recorded by the Texas Inland district with a 5.3 percent rise from the previous year. Involved was an increase of 4,783,000 barrels from total crude runs of 89,511,000 barrels during 1951.

The Rocky Mountains area was the No. 2 percentage gainer from 1951—5.2 percent up from 1951 crude runs totaling 83,843,000 barrels. Rocky Mountains District 3 recorded a major rise of 20 percent from 1951; however, only slightly more than 1 million barrels were involved. Majority of the Rocky Mountains crude runs stemmed from District 4, which reflected a 4.2 percent hike—to runs totaling 81,567,000 barrels—from a 1951 total of 78,367,000 barrels.

Texas Gulf Coast led in total volume of crude runs to stills last year with 585,205,000 barrels—13,214,000 barrels or 2.3 percent more than the total for the previous year. This figure resulted from a 1952 daily average run of 1,599,000 barrels.

Second in volume for the year was the Illinois, Indiana and Kentucky district, where a 2 percent upward surge in daily average run led to an average of 1,225,000 barrels a day last year, a 24,000-barrel rise from 1951. This average allowed an increase in total annual crude runs to stills of 10,174,000 barrels more than 1951's 438,427,000 barrels.

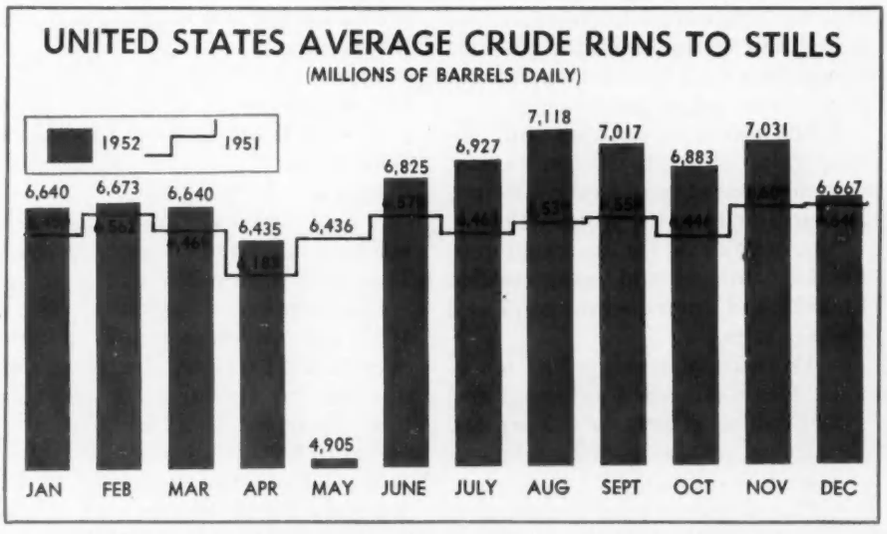
The East Coast, with 1952 daily average runs of 1,028,000 barrels, and California, with a daily average of 988,000 barrels, ranked third and fourth, respectively.

Refinery Production of Major Products and Percent Yield from Crude Run at U. S. Refineries

Results in December and Year 1952, compared with same periods in 1951. Figures are from Bureau of Mines except that November and December, 1952, are estimated with aid of A.P.I. weekly bulletins.

(THOUSANDS OF BARRELS)

ITEM	1951	1952	Percent Diff.
Gasoline			
Production, December	89,136	95,095	+ 6.7
(Daily Average)	2,891	3,068	+ 6.1
Percent Yield	42.9	44.1	+ 2.8
Production, Year	1,009,277	1,050,187	+ 4.0
(Daily Average)	2,765	2,869	+ 3.8
Percent Yield	42.4	42.9	+ 1.2
Kerosine			
Production, December	12,171	13,128	+ 7.9
(Daily Average)	393	423	+ 7.6
Percent Yield	5.8	6.1	+ 5.2
Production, Year	135,742	132,331	— 2.5
(Daily Average)	372	362	— 2.7
Percent Yield	5.7	5.4	— 5.3
Distillate			
Production, December	44,693	46,947	+ 5.0
(Daily Average)	1,442	1,514	+ 5.0
Percent Yield	21.4	21.8	+ 1.9
Production, Year	475,801	522,077	+ 9.7
(Daily Average)	1,304	1,427	+ 9.4
Percent Yield	20.0	21.3	+ 6.5
Residual			
Production, December	40,693	39,737	— 2.4
(Daily Average)	1,313	1,282	— 2.4
Percent Yield	19.4	18.4	— 5.2
Production, Year	469,377	452,615	— 3.6
(Daily Average)	1,286	1,237	— 3.8
Percent Yield	19.7	18.5	— 6.1
Lubricants			
Production, December	5,157	4,875	— 5.5
(Daily Average)	166	157	— 5.4
Percent Yield	2.5	2.3	— 8.0
Production, Year	61,489	56,212	— 8.6
(Daily Average)	168	154	— 8.3
Percent Yield	2.6	2.3	—11.5



Crude Runs to Stills in U. S. Refineries and Percent Refinery Capacity Used by Districts, December and Years, 1951 and 1952

Runs from Bureau of Mines, except November and December, 1952, from American Petroleum Institute: Capacities from American Petroleum Institute.

(THOUSANDS OF BARRELS)

Refining District	CRUDE RUN IN DECEMBER: Total Amount Run During Month			CRUDE RUN IN DECEMBER: Daily Average Run During Month		REFINING CAPACITY AND USE IN DECEMBER: Daily Capacity		REFINING CAPACITY AND USE IN DECEMBER: Percent Capacity Used		CRUDE RUN DURING YEAR: Total Amount Run During Year		CRUDE RUN DURING YEAR: Daily Average Run During Year		
	Dec., 1951	Dec., 1952	% Diff. '51-'52	Dec., 1951	Dec., 1952	Dec., 1951	Dec., 1952	Dec., 1951	Dec., 1952	1951	1952	1951	1952	% Diff. '51-'52
East Coast	32,625	32,798	+ 0.53	1,052	1,058	1,094	1,103	96.2	95.9	370,394	376,610	1,015	1,028	+ 1.3
Appalachian	5,788	6,265	+ 8.24	187	202	194	212	96.4	95.3	65,455	66,786	179	183	+ 2.2
District No. 1	3,221	3,355	+ 4.16	104	108	116	124	89.7	87.1	37,674	38,639	103	106	+ 2.9
District No. 2	2,567	2,910	+13.36	83	94	78	88	106.4	106.8	27,781	28,147	76	77	+ 1.3
Ill., Ind., Ky.	38,836	39,543	+ 1.82	1,253	1,276	1,317	1,398	95.1	91.3	438,427	448,601	1,201	1,225	+ 2.0
Okla., Kans., Mo.	16,732	17,496	+ 4.57	540	564	615	651	87.8	86.6	189,699	198,965	520	544	+ 4.6
Texas Inland	7,554	8,036	+ 6.38	244	260	290	297	84.1	87.5	89,511	94,294	245	258	+ 5.3
Texas Gulf Coast	50,507	52,917	+ 4.77	1,629	1,707	1,667	1,786	97.7	95.6	571,991	585,205	1,567	1,599	+ 2.0
Louisiana Gulf Coast	15,641	17,097	+ 9.31	505	552	507	525	99.6	105.1	183,065	190,880	502	521	+ 3.8
Ark., and La. Inland	2,271	2,631	+15.85	73	85	88	93	83.0	91.4	28,889	29,119	79	80	+ 1.3
Rocky Mountains	7,278	7,953	+ 9.27	234	256	272	283	86.0	90.5	83,843	88,059	229	241	+ 5.2
District No. 3	538	539	+ 0.19	17	17	22	22	77.3	77.3	5,476	6,492	15	18	+20.0
District No. 4	6,740	7,414	+10.00	217	239	250	261	86.8	91.6	78,367	81,567	214	223	+ 4.2
California	28,800	30,042	+ 4.31	929	968	1,185	1,237	78.4	78.3	349,130	361,484	957	988	+ 3.2
Total U.S.	206,032	214,778	+ 4.24	6,646	6,928	7,229	7,585	91.9	91.3	2,370,404	2,440,003	6,494	6,667	+ 2.7

LPG

Production, Sales to Rise

By GEO. R. BENZ and P. W. TUCKER
Engineering Department, Phillips Petroleum Company

SALES OF LIQUEFIED petroleum gas continued to increase in 1952, although the rate of increase was less than that for the previous year. The outlook continues excellent.

Sales of LPG in 1952 are estimated to be 4,110,000,000 gallons or 6.7 percent more than the 1951 volume. This is exclusive of the estimated 400 million gallons used for the manufacture of synthetic rubber components.

While this is in contrast with annual gains of 25 to 30 percent recorded in recent years in the industry, it is greater than the gain in 1949.

The outlook is for increased production, storage, and transportation in 1953 and consequently continued gains in sales.

Domestic and motor fuel use of LP-Gas is estimated to have gained 226 million gallons, or 9.2 percent.

Industrial and miscellaneous uses gained an estimated 2.1 percent.

Gas manufacturing use dropped about 5.7 percent.

Chemical use was up 4.9 percent.

Bulk distribution trend continues and motor fuel use is expanding.

Increased production and more underground storage seen for 1953.

LPG now represents almost half of all liquids produced at natural gasoline plants.

Domestic and Motor Fuel

Estimated sales of LPG for domestic and internal combustion engine fuel purposes in 1952 are estimated at 2,683,000,000 gallons. This represents an increase of 9.2 percent over 1951 sales in this category, or almost twice the amount sold by the entire industry in 1946 for all purposes.

Weather in most areas again played a vital role in the domestic and motor fuel sales of LPG. The country, with the exception of the upper Midwest states, experienced a very mild year with above normal temperatures prevailing during the late winter of 1951 and the early winter season of 1952. This was responsible to a large extent for the less than normal rate of increase.

The trend toward bulk distribution of LPG continues at an accelerated rate with house heating pacing the demand. In the bulk distribution field there is also a trend toward the installation of larger storage tanks which will help smooth out winter deliveries. This trend must continue.

Consumption as a motor fuel in 1952 rose an estimated 25 percent over the 1951 volumes. Increased consumption by trucks, buses and farm tractors, many of which were converted to LPG usage during 1951, accounted for a major portion of this increase. The severe drought in the Southwest resulted in greatly increased use of irrigation pumps, many of which are powered by LPG fueled engines.

While actual figures are not available, sales of factory equipped LPG fueled tractors reached a new high with six manufacturers now producing models. Preliminary reports indicate that LPG carburetion conversion kit sales are down for this year as compared to 1951. Sales of conversion kits in the first six months of 1952 are about 65 percent of the sales in the first six months of 1951. However, it is expected that the number of conversions made this year will compare very favorably with those made last year. It is felt that many of the kits sold last year were for dealer stocks. This is borne out by the indication that carburetion kit sales in the Southwest are slightly higher this year than last year. In this area dealer stocks were built up in previous years.

The tax on fuels for highway use was partially equalized by the application of $0.02 per gallon federal tax on diesel fuels for this purpose on November 1, 1951. However, there is still no federal tax on diesel fuel used in "off highway" equipment although LPG has always been subject to the federal tax when used as motor fuel in other than stationary engines, rail cars and farm tractors. This tax inequality is a severe limitation on the use of LPG in such equipment as mine trucks and construction machinery and should be corrected.

Substantial gains in the "domestic use" have been registered through great interest in and use of LPG for crop dehydration and tobacco curing.

Industrial and Utility Use

LPG sales for industrial and miscellaneous purposes totalled an estimated 275,000,000 gallons at year's end, an increase of 2.1 percent over 1951. There were two major factors which affected industrial sales. These were the steel strike and the extension and expansion of natural gas lines. The steel strike curtailed steel processing and fabrication which, in turn, reduced the amount of LPG necessary for process heating or treating. The extension and expansion of natural gas mains has the obvious effect of fuel replacement; however, such extended use of natural gas does open up the way for increased use of LPG for "standby" purposes.

Sales for gas manufacturing purposes are estimated at 266 million gallons, a decrease of about 5.7 percent from the preceding year. There are three main factors contributing

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to this decrease. These include: (1) mild weather, (2) extension and expansion of natural gas lines, and (3) the steel strike. Many utilities entered the year with their storage full and, with the mild weather, were not required to use the usual amount. The steel strike reduced industrial activity and consequently gas consumption in many locations. The extension and expansion of the natural gas lines resulted in some replacement of LPG with natural gas. The extended use of natural gas offers good possibilities for increased sales of LPG for peak shaving and standby purposes.

As 1952 closed there were several hundred towns served by about 366 city gas companies using LPG as base material in gas manufacture, peak shaving, enriching, or for standby in 39 states and three provinces of Canada.

The sale of LPG as a raw material for the manufacture of chemicals and chemical intermediates still continues strong. An estimated 886 million gallons were sold for this use, representing a 4.9 percent increase over last year.

This increase would have been greater had the steel strike not delayed completion of several large plants scheduled to come on stream during the summer or early fall. Other factors leading to the comparatively small increase in 1952 were the increased interest in ethylene from refinery streams, and in ethane, from both refinery and natural gas streams, as a base stock for the production of ethylene through cracking processes. In addition, the refinery strike in May curtailed deliveries to some chemical plants.

One large installation for the recovery of ethane, propane, butanes and heavier hydrocarbons from natural gas "in transit" commenced operation this year, with a still larger installation scheduled to start operation early in 1953. In both of these plants, ethane will be extracted for use as raw material for chemical manufacture, and the propane, plus that amount of the butane that cannot be blended into motor fuel, will be sold as LPG.

The trend towards using ethane, rather than propane or butane, for chemical manufacture will undoubtedly continue. However, because the problem of transportation of ethane or ethylene over the road in refrigerated vessels or on water in refrigerated barge tanks is not completely worked out, it is necessary that a plant using these lighter hydrocarbons either: (1) move to the source or (2) move close to a pipe line where hydrocarbons may be extracted.

The use of LPG as raw material for the manufacture of synthetic rubber components increased an estimated 6.7 percent to a total of 400 million gallons for the year. With the development of synthetic rubber superior in many respects to natural rubber (e.g., cold rubber), unstable prices for natural rubber and the necessity for maintaining a healthy domestic synthetic rubber industry there is no question but what this market should continue.

Supply and Storage

As the industry entered the winter of 1952-53, the supply appeared to be adequate. However, an unusually severe winter could tip the balance and create a shortage. A sizeable increase in production is expected from plants now being completed or under construction. Many refineries are finding it to their advantage to extract and sell propylene and butylenes for chemical use and others to convert these hydrocarbons into motor and aviation fuel by polymerization and alkylation. LPG now represents nearly half of all liquids produced at natural gasoline plants.

Underground storage of liquefied petroleum gas in caverns washed out of salt beds or salt domes; or in caverns mined out of suitable formations is increasing. Present underground storage capacity for LPG is nearing 3 million barrels (126 million gallons). More than twice this amount of such storage is under construction or under active consideration. This type of storage, however, is not the answer to the industry's problem of seasonal demand vs. year-round production. LPG storage is a problem of all phases of the industry. There must be a balance of storage between the producer, bulk-distributor and customer. The development of a good summer load (demand) and the maintenance of low winter to summer ratio still demands full attention of industry. The National Committee for LPG Promotion has developed a storage program which has been of assistance in establishing a trend toward such a balanced storage program.

Marketed Production of Liquefied Petroleum Gas

Year	TOTAL SALES		DISTRIBUTION—1,000 Gallons							
	Gallons in Thousands	Percent Increase	Domestic and Motor Fuel[1]	Percent Increase	Ind. and Miscl.[2]	Percent Increase	Gas Mfg.	Percent Increase	Chemical Mfg.	Percent Increase
1922	223	....								
1923	277	24.4								
1924	376	36.0								
1925	404	7.2	Sale of Liquefied Petroleum Gas Confined Primarily to Bottled Gas Business Prior to 1928							
1926	465	15.2								
1927	1,091	134.6								
1928	4,523	314.6	2,600	....	400	....	1,500	.....	.....	.....
1929	9,931	119.6	5,900	126.9	1,500	275.0	2,500	66.7	.....	.....
1930	18,017	81.4	11,800	100.0	2,200	46.7	4,000	60.0	.....	.....
1931	28,770	59.7	15,295	29.6	7,172	226.0	6,303	57.6	.....	.....
1932	34,115	18.6	16,244	6.2	8,167	13.9	9,703	53.9	.....	.....
1933	38,931	14.1	16,626	2.3	13,987	71.3	8,318	—14.3	.....	.....
1934	56,427	44.9	17,681	6.3	32,448	132.0	6,298	—24.3	.....	.....
1935	76,855	36.2	21,380	20.9	47,894	47.6	7,581	20.4	.....	.....
1936	106,652	38.8	30,014	40.4	67,267	40.4	9,371	23.6	.....	.....
1937	141,400	32.6	40,823	36.0	62,610	[3]	11,175	19.3	26,792	.....
1938	165,201	16.8	57,832	41.7	62,694	0.0	12,386	10.8	32,299	20.5
1939	223,580	35.3	87,530	51.4	93,723	49.4	15,435	24.6	26,892	—16.7
1940	313,456	40.2	134,018	53.1	124,482	32.8	20,285	31.4	34,671	29.0
1941	462,852	47.7	220,722	64.7	172,669	38.6	25,255	24.5	44,206	27.5
1942	585,440	26.5	303,857	37.6	197,179	14.2	31,366	24.2	53,038	20.0
1943	675,233	15.3	344,962	13.6	237,396	20.4	37,519	19.6	55,356	4.4
1944	898,071	33.0	445,617	29.2	254,590	7.3	45,879	22.3	151,985	175.0
1945	1,067,979	19.0	533,262	19.7	256,577	0.8	53,849	17.4	224,291	47.5
1946	1,410,370	32.1	758,466	42.2	253,745	—1.1	86,660	61.0	311,499	38.8
1947	2,008,262	42.4	1,150,538	51.7	274,125	8.0	169,332	95.4	414,267	33.0
1948	2,511,160	25.0	1,473,289	28.1	275,883	0.6	237,638	40.3	524,350	26.6
1949	2,658,749	5.9	1,627,550	10.5	247,103	—10.4	239,210	0.6	544,886	3.9
1950	3,254,082	22.4	2,022,464	24.3	355,456	[4]	251,694	5.2	624,468	14.6
1951	3,852,411	18.4	2,456,804	21.6	269,408	[4]	281,692	11.9	844,507	35.3
1952	4,110,000	6.7	2,683,000	9.2	275,000	2.1	266,000	—5.7	886,000	4.9

[1] Household use plus other requirements by these customers such as irrigation pumping, tractor fuel, flame weeding, chicken brooding and similar uses. Included also is LP-Gas sold by domestic distributors but used for industrial purposes, internal combustion engine fuel and for gas manufacturing purposes. Included also, in 1951 and 1952 only, is LP-Gas sold direct by producers and marketers solely for fueling internal combustion engines. (See special note.)

[2] For all years prior to 1951, include LP-Gas sold for fueling internal combustion engines. (See special note.)

[3] Not comparable due to segregation of chemical manufacturing.

[4] Not comparable due to change in method of reporting LP-Gas sold for fueling internal combustion engines.

REMARKS: In this table total sales for all years except 1952 were obtained from U. S. Bureau of Mines reports. Distribution for the years 1931 to 1951, inclusive, was obtained from the same source. All other volumes were estimated by the writers. The total sales volume includes all LP-Gas (Propane, butane and propane-butane mixtures) when sold as such. Until 1944 the sale of pentane when sold for any purpose other than motor fuel blending was included. Since then it has been excluded. It does not include butane when blended with heavier petroleum fractions for motor gasoline purposes. Intercompany sales transactions such as purchases of LP-Gases by one company from other companies and resold as LP-Gases have been eliminated in order to avoid duplication of sales figures. The data do not reflect sales of hydrocarbons to plants manufacturing synthetic rubber or aviation gasoline or their components.

New Production Methods

Seek More Efficiency at Lower Costs

By J. A. PERKINS, JR.
Gulf Oil Corporation, Houston

IN REVIEWING THE past year's activity in search of new methods introduced, one immediately becomes aware of the very nature of progress in production. It is not something that can be compared to the brilliance of a shooting star streaking across the heavens but, more fitting, it may be compared to the relentless driving force of a giant bulldozer busily engaged in changing the shape of a mountainside. It has been said that "nothing is ever really new" and, as these new methods are listed, one is almost forced to agree with the adage.

This summary will deal with those things which have reached a degree of development within the last year which at least have entitled them to field application along with those methods which may be considered entirely new.

There has appeared in the industry a "new feeling" which probably will have a tremendous effect on new methods in the future. Industry is appreciating the serious need for the technical production foremen and superintendents. No longer does industry look around the drilling departments in search of a worn out "wildcatter" when they need a production foreman. To the contrary, highly capable people with technical backgrounds have been specifically groomed for production jobs. In the future the industry can look forward to an increase in the number of new methods developed in any one year.

Reservoir Engineering

WATER-IMBIBITION.[1] In the Spraberry formation the oil is stored in a tight matrix, with most of the permeability being the result of a large number of fractures. Theory of water-imbibition is that the fractures will provide ready access to large areas of the matrix and that if these fractures are filled with water, natural imbibition or the tendency of the water to soak into the rock might displace the oil and release it from the matrix into the flow stream through the fractures.

Laboratory data obtained from Spraberry cores indicated that water-imbibition should prove successful in increasing ultimate recovery from 10 percent by primary means to 30 percent by this type of secondary recovery. A pilot project is now in operation by the Atlantic Refining Company injecting 200 barrels of water per well per day into two wells, and a third well was to be added soon. No results from the flood had been noted as of Jan. 4, 1953, at which time only 17,547 barrels of water had been injected.

Well Completions and Completion Tools

PERMANENT TYPE COMPLETIONS.[2] Well completions are now being made wherein the tubing and well-head are set in place only once in the life of the well and the completion or remedial work is performed through the tubing with a tubing type perforator, a retrievable tubing extension and other wire line tools. With this equipment it is possible to squeeze off a lower sand and complete in a higher sand without pulling tubing and without the necessity of filling the hole with mud to control pressure.

Thus, this type of completion affects a saving in both time and money by eliminating pipe handling and mud costs. It also avoids risk of mud block in the perforations, which often occurs when completion is made with mud in the hole.

Equipment is now being developed which will enable remedial work to be performed to squeeze and reperforate the same section to shut off salt water or gas. The tubing type perforator now used in this work is 1¾-inch outside diameter and employs five jet shots per foot. These charges fire at an angle of approximately 45 degrees above horizontal and are contained in a self-destructible aluminum carrier which falls to the bottom of the hole after shots are fired.

GRAVEL PACK-STRAINER ASSEMBLY.[3] Use of this assembly will allow the completed interval, either open hole or perforated casing, to be pressure packed and the strainer setting made in one trip of the pipe. The assembly consists of a nose piece, slotted pipe, liner, setting tool and sleeve and inserted wash pipe. The nose piece contains a flapper valve that is held in an open position by the wash pipe. Gravel is pumped down the tubing or drill pipe, through the wash pipe and out the nose piece.

Fluid pressure is then applied and the gravel pack-strainer assembly reciprocated by raising and lowering the tubing or drill pipe. These pressures cause the gravel to be pressure packed in and opposite the completed interval. The assembly is then washed into place by normal circulation.

Right hand rotation of the tubing

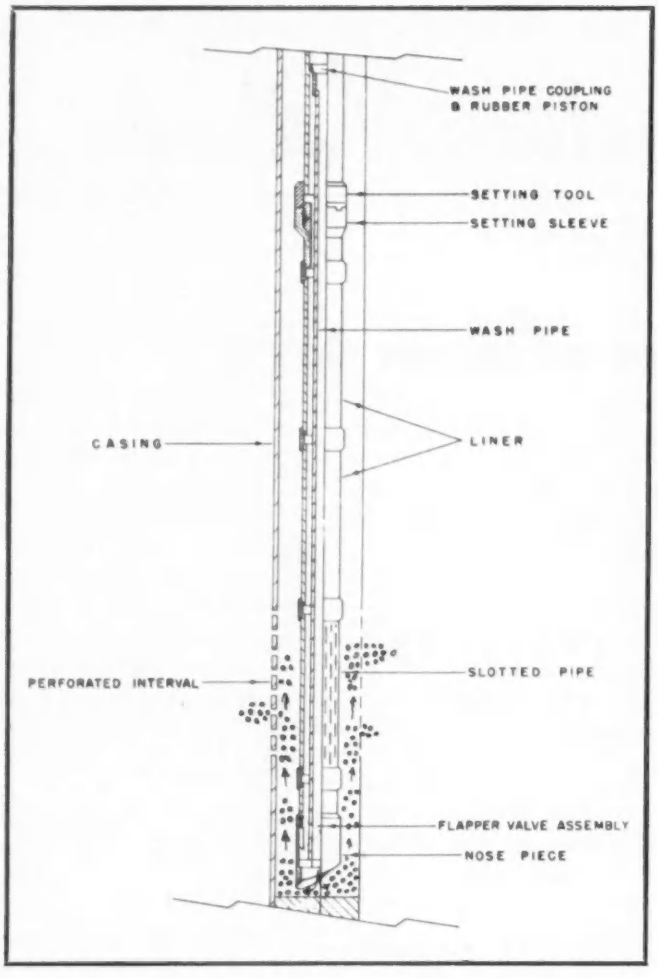

FIGURE 1.
Gravel pack strainer.

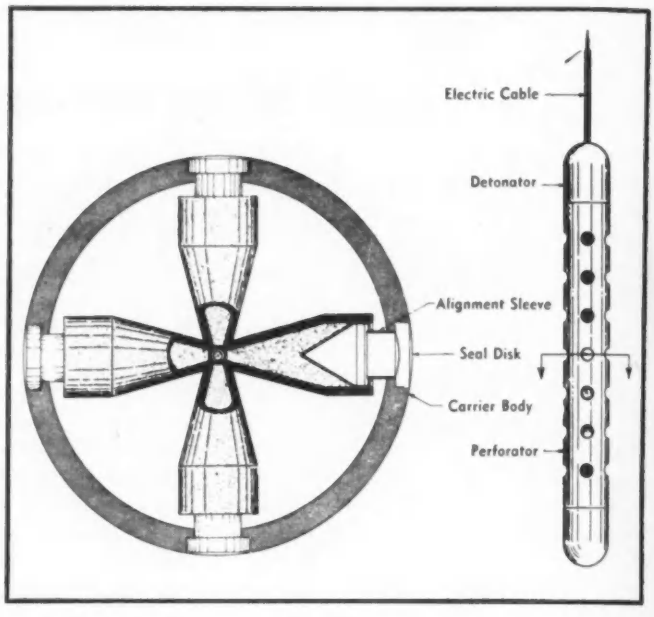

FIGURE 2.
Jet perforator to provide type of casing perforations required for squeeze cementing oil and gas wells.

or drill pipe causes the setting tool to become disengaged from the setting sleeve. The tubing or drill pipe, the setting tool and wash pipe are then pulled from the hole and the conventional tubing setting made. The flapper valve in the nose piece is allowed to close when the wash pipe is pulled.

SHOOT AND PRODUCE GUN.[4] This perforating gun is run in the well on the tubing string and will permit testing of the perforated interval immediately after perforating. The perforating string normally consists of a gun carrier, a firing head, a perforated nipple, a collar locator and packer, if desired, and tubing. The string is made up and run in the well in the order named above. The perforated nipple may be positioned below the interval to be perforated and the drill mud displaced by oil or such fluid as desired.

After spotting this fluid, the tubing is raised, a casing collar located, the gun carrier positioned opposite the zone to be perforated, the packer set and the well-head or Christmas tree installed. A sinker bar is then dropped down the tubing, strikes the bursting disc and the hydraulic head actuates the firing mechanism.

If the well is capable of flowing, the formation fluids move through the tubing to the surface. Only a relatively short time should be required before the well can be turned into the stock tanks.

FOUR-WAY JET PERFORATING GUN.[5] A new jet perforating gun has been designed which should aid in obtaining more successful squeeze-cement jobs through perforated casing. Investigations indicated that cement squeezed through perforations would cover an average of only about 140 degrees around the circumference of the pipe for each perforation on the same horizontal level and that the usual pattern of vertical and staggered shots tended to cause the cement to spiral or channel around the pipe.

In order to obtain a better spread of the cement around the casing, the four-way jet gun will perforate four holes 90 degrees apart at the same horizontal level and will make a minimum of four and a maximum of 12 holes per foot. Each additional set of four horizontal holes are turned 45 degrees from the adjacent set and are spaced three inches vertically from the other set of four horizontal holes.

Well Stimulation

MULTIPLE FRACTURING.[6] Multiple fracturing is an improvement over the original hydraulic rupturing method already proven in field application for increasing the number of flow channel into the well bore. In multiple fracturing, a single fracture is first produced in the formation by hydraulic pressure, using a relatively low-penetrating and/or high viscosity fracturing fluid, such as napalm gel and thickened acid. This single fracture is then sealed by injecting into the well a suitable temporary bridging agent, such as compressed and ground pellets of naphthalene, suspended in a carrying medium.

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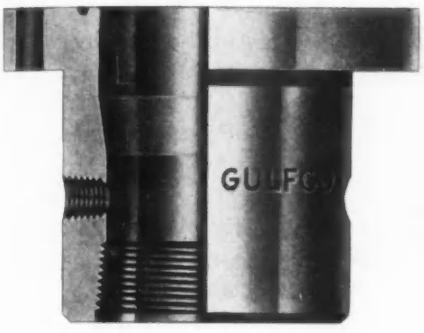
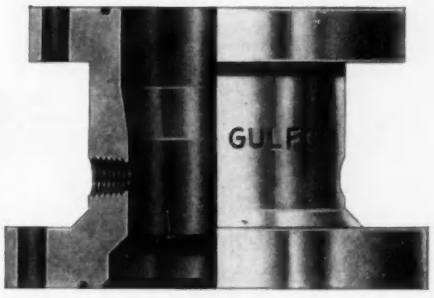
GULFCO FORGED STEEL CASING HEADS

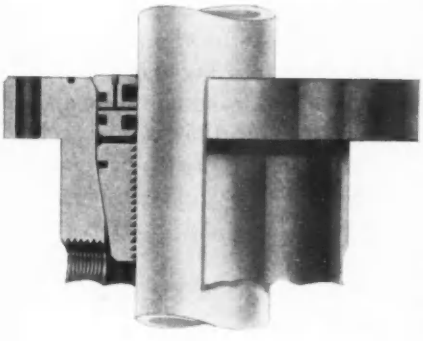


TYPE RS CASING HEAD BODY

TYPE RS-F CASING HEAD BODY

These Gulfco Forged Steel A.P.I. Full Opening Casing Head Bodies are designed for maximum practical flexibility. All hangers shown below are interchangeable in these bodies giving the operator a varied choice of casing suspension, and the option of changing the casing program without removing casing head body. Type RS Casing Head Body can be furnished with male threaded bottom connection if desired.



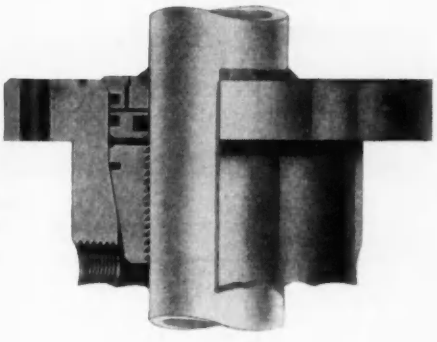


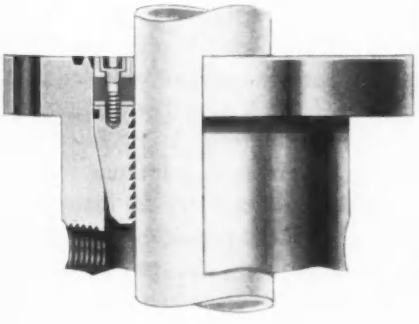
TYPE RS-4 SLIP-TEST SEAL SUSPENSION

This field tested seal owes its merit to simplicity in design, rugged construction and dependability in use. After the three-segment hinged slips are set with the proper tension on the casing, the pipe is cut at the desired length above the casing head flange. Then the seal is slipped over the pipe and the oversized synthetic rubber "O" rings effect a positive pressure seal in the annular space between the pipe and the I.D. of the casing head. The seal can be tested immediately without installing the next head or a test flange.

TYPE RS-3 SLIP-TEST WELD SUSPENSION

The slips used with this seal are identical to those furnished with the Type RS-4. The difference in the seals is that the Type RS-3 is provided with a bevel for welding around the pipe at the top. This type seal can be tested between the weld and the synthetic "O" rings without the use of a test flange and before the tubing head is installed.





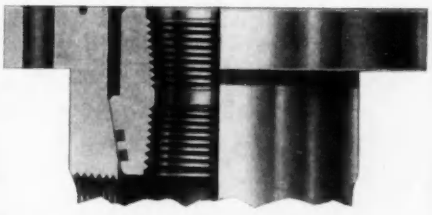
TYPE RS-1 SLIP-PACK SUSPENSION

This slip suspension hanger is made in three segments hinged together to assure perfect concentric alignment. After the cement has set, proper tension is taken on the casing and the slip-pack assembly is wrapped around the pipe and dropped to its seat.

The casing load is immediately taken by the slips, then the socket head cap screws may be tightened to compress the synthetic rubber packing and effect a positive seal.

RS-2 THREADED SUSPENSION

This "Boll-Weevil" Threaded Suspension hanger is simple, easy to install and has an unusually efficient hydraulic packing arrangement. When this type suspension is desired, the lower flange of the G-1F or G-2F tubing head is furnished with a ring of hydraulic packing which bears on the hanger and holds it firmly in position.



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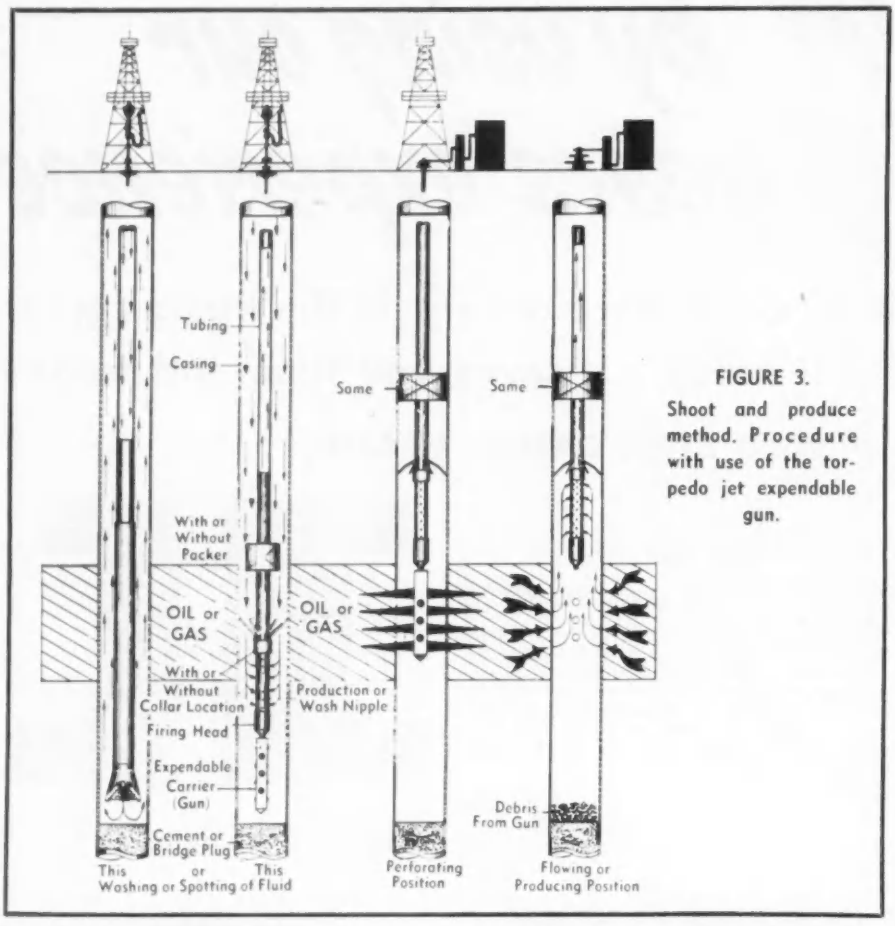

FIGURE 3.
Shoot and produce method. Procedure with use of the torpedo jet expendable gun.

FIGURE 4.
Portable and collapsible rubber tank.

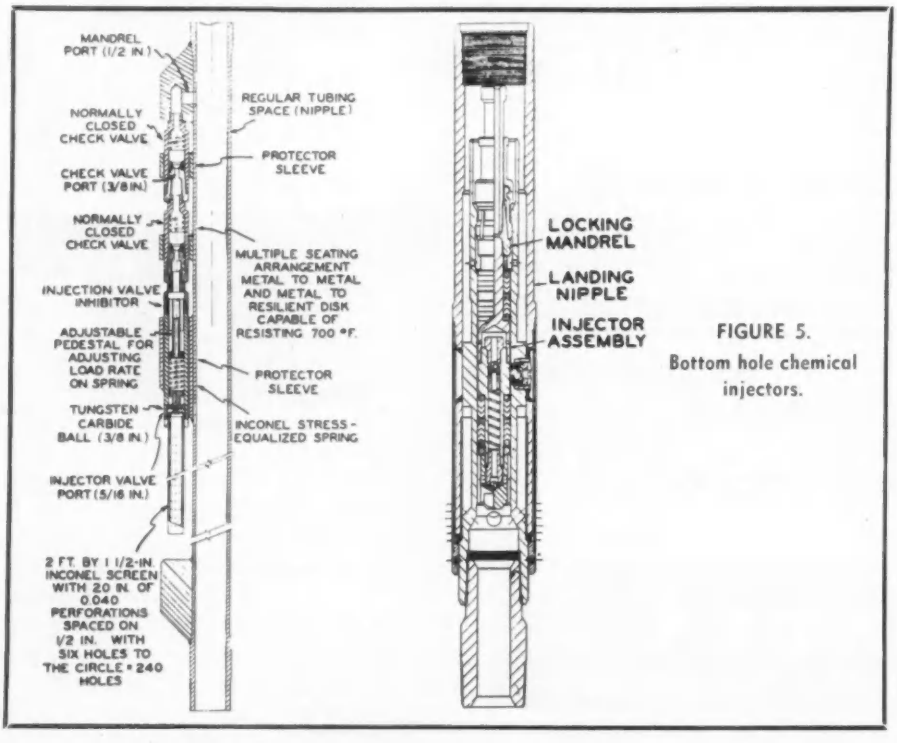
MANDREL PORT (1/2 IN.)
NORMALLY CLOSED CHECK VALVE
CHECK VALVE PORT (3/8 IN.)
NORMALLY CLOSED CHECK VALVE
INJECTION VALVE INHIBITOR
ADJUSTABLE PEDESTAL FOR ADJUSTING LOAD RATE ON SPRING
TUNGSTEN CARBIDE BALL (3/8 IN.)
INJECTOR VALVE PORT (5/16 IN.)
2 FT. BY 1 1/2-IN. INCONEL SCREEN WITH 20 IN. OF 0.040 PERFORATIONS SPACED ON 1/2 IN. WITH SIX HOLES TO THE CIRCLE = 240 HOLES
REGULAR TUBING SPACE (NIPPLE)
PROTECTOR SLEEVE
MULTIPLE SEATING ARRANGEMENT METAL TO METAL AND METAL TO RESILIENT DISK CAPABLE OF RESISTING 700 °F.
PROTECTOR SLEEVE
INCONEL STRESS-EQUALIZED SPRING
LOCKING MANDREL
LANDING NIPPLE
INJECTOR ASSEMBLY

FIGURE 5.
Bottom hole chemical injectors.

ceding rupture, succeeding fracturing can be done. After multiple fracturing has been completed, the sealing agent will dissolve and flow out with the produced oil. Operations of this type are particularly applicable to relatively long, open hole producing sections. Use of this process has given increased production on an average of 185 percent for a single fracturing to 245 percent for multiple fracturing.

Artificial Lift

SONIC PUMP.[7] A new method of pumping oil wells, which shows considerable promise on experimental runs, is the so called "sonic pump" which operates on infrasonic energy imparted to the tubing of the well. These low frequency sound waves are imparted to the top of the tubing string which hangs free in the well and the resultant elastic wave energy produces rapid elongations and contractions of each end of the tubing.

In effect, the tubing reaches down into the oil, traps some of the oil above the first of a series of check valves, lifts the oil, then reaches down for another gulp. Each stroke or vibration is only about 3/8-inch long but the end of the tube makes ten strokes per second and results in a pump that is able to lift hundreds of barrels of oil a day. A well in California is presently pumping 600 barrels of water and 10 barrels of oil per day.

The same principle has been put to use on the surface and used as a pipe line pump with much more favorable results than the down-the-hole pump.

GAS LIFT. Further development in gas lift is the use of a solid interface between the injected gas and the fluid to be lifted. Such a method eliminates gas slippage, permits lower injection ratios and pressures, eliminates gas-cut fluids and tendency for emulsion and the frequent passage of the solid interface through the tubing keeps paraffin accumulation to a minimum.

The "free piston" gas lift[8] system uses one string of tubing with gas lift valves in the string and a piston shaped tool or solid interface free to move up and down the tubing. At the start of the cycle this piston, which contains sleeve valves, pressure charged

Gives you More for your Money...

Low cost conversion of one type of GOT gas lift valve to another is your absolute guarantee against ever having large stocks of the "wrong kind of valves."

Should the GOT valve you have in stock not be suited for your present well conditions, it may be easily converted to any of three other valves. This is done simply by substituting the proper head piece. The most expensive part of the valve . . . the main body . . . is re-used, resulting in a very substantial saving.

Take advantage of this money-saving GOT feature: *Make all of your gas lift valves GOT Gas Lift Valves.*

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ARE YOU PUMPING WHEN YOU COULD BE GAS LIFTING?

bellows and flexible rubber packer, rests on a stop in the tubing just above an operating gas lift valve.

When the required head of fluid compresses the metallic bellows, the sleeve valves close and the rubber packer expands to seal off inside the tubing. Timed with the fluid build-up, injected gas drives the piston and the fluid above it to the surface. Then tubing pressure bleeds down below the pressure charge on the bellows to cause contraction of the rubber packer and reopens the sleeve valves. This permits the piston to return to its original position on the stop in the tubing.

The "ball pump" gas lift[9] system uses two strings of tubing with a restriction, a return bend and a standing valve at the bottom. On each cycle the gas is injected down one string of tubing preceded by the solid interface, which in this case is a synthetic rubber ball, and when the ball is forced through the restriction it picks up its load of oil and is pushed up the return tubing to the surface. Principal disadvantage of this system is the two strings of tubing required in the installation.

PLASTIC SUCKER ROD GUIDE.[10] A sucker rod guide has been designed to keep the rods centered in the tubing and thus minimize damage to the tubing and rod strings caused by crooked hole and spiraled tubing.

It is made of a hard and tough plastic composition formed into a cylinder about 12 inches long and with an outside diameter of approximately the inside diameter of the tubing. This cylinder is mounted around a steel rod with a standard box on one end and a pin on the other, and it is so arranged to permit free movement on the rod or it can be fixed in an immovable position. It is installed as an integral part of the rod string. The guide is grooved longitudinally to allow fluid passage during pumping operations.

Fluid Separation

FIELD STABILIZATION OF CONDENSATE AND VOLATILE CRUDES.[11] Better production methods increase revenue from gas-condensate wells. These are low-temperature separation of condensate and natural gas, lease stabilization of condensate from low-temperature separators, and production of natural gasoline and LPG on the lease.

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The low-temperature separation yields separator liquid recovery rich in both the lighter and the normally liquid hydrocarbons.

Stabilization of this separator liquid under controlled pressure and temperature permits a maximum volume of hydrocarbon liquid, stable under stock tank conditions, to be recovered. Production of natural gasoline and LPG on the lease is a further step in converting to more desirable products the condensate that has been stabilized.

PERMEABLE PLASTIC IN FLUID SEPARATION.[12] A plastic material made in varied pore size and permeability has proved efficient in the separation of different fluids and gases. It is capable of removing moisture from hydrocarbon gas, separating different gases, and separating water from distillates and crudes. These plastics have particular application in the prevention of hydrates in the production of high pressure gas wells, and in the breaking of certain emulsions. Their unusual properties are based primarily on three principles.

Separation by diffusion, known as atmolysis, was used successfully in atomic development in separating dissimilar molecules of Uranium gases. It is based on the principle involving the kinetic theory of gases wherein the lighter molecules travel faster and collide more frequently than do the molecules of heavier gas. Thus, in a mixture of methane and hexane gases, the lighter methane molecules travel much faster than the heavier hexane molecules and tend to traverse the permeable plastic while the heavier molecules concentrate until a saturation point is reached and form into droplets which fall to the bottom of the vessel to be removed as liquid.

Separation by mist extraction involves removing free water entrained as extremely fine particles in a hydrocarbon gas and is similar to that of separating a light gas from a heavier gas. Gas is capable of traversing the multi-channel plastic with greater ease than the heavier, more sluggish mist which accumulates on the upstream side of the barrier. This mist forms into droplets which block the minute passages until the pressure differential across the entire plastic element becomes great enough to force the newly formed liquid through the plastic walls where it falls to the bottom of the vessel.

Separation by coalescing involves separating water from a liquid hydrocarbon and is based on the principle that two immiscible liquids of different surface tension cannot take possession of a surface at the same time and that the fluid in possession of the surface of the connecting channels will traverse it with greater ease while the remaining liquid will tend to be repelled and become concentrated at the small openings until forced through by pressure differential.

Material from which the plastic is made lends itself more readily to wetting by the hydrocarbon fluid, thereby affording easier passage for the distillate, while the water accumulates on the upstream side of the barrier until forced through by the back pressure built up. On the downstream side, the liquids separate according to their differences in densities.

Storage

COLLAPSIBLE RUBBER TANK.[13] A recent development that may find extensive use is a collapsible, barge-shaped tank made of rubber reinforced with a nylon fabric. It is fully flexible and can be rolled up when not in use. It is offered in sizes of 100, 250, 500 and 1000-barrel capacity complete with hold-down bands, swamp type anchors and vent connections. This type of tank appears particularly adaptable for marshland or offshore operations in that it requires no mooring structure or docking facilities and can be

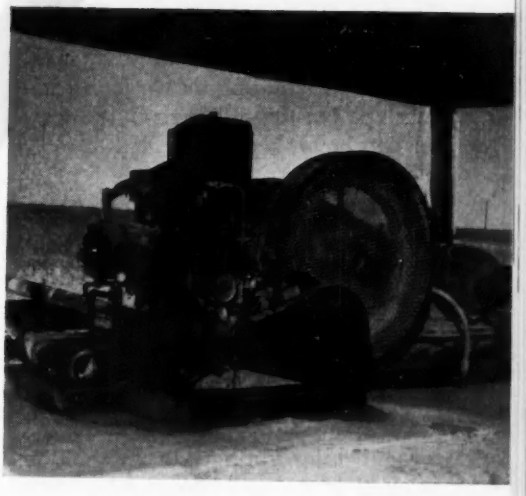
Secondary Recovery...Lease Electrification

For either or both, we can furnish the turnkey job that fits your needs in every detail

Secondary recovery, made possible by waterflooding, gas-injection or air-injection systems, is now accounting for huge yields on many oil-producing properties. Bethlehem can help—help tremendously—if you are considering the installation of such a system. This technical assistance is double-barreled: (1) we are unusually well equipped to work with your engineers, and (2) we can supply every item of equipment, including pipe lines, water filters, treaters, chlorinators, pumps, compressors, valves, storage tanks, injection equipment, Bethlehem pumping units, prime movers, and down-hole equipment.

The same is true of lease-electrification systems. For over a decade Bethlehem Supply engineers have designed and installed complete electrification plants ranging in size from small, simple layouts to very complex networks serving scores of wells. In determining plans and equipment, Bethlehem personnel will team up nicely with your own engineering staff; in every small detail, the turnkey job will be tailored to meet your needs.

And of course, all items of equipment are available through Bethlehem. Such items as:



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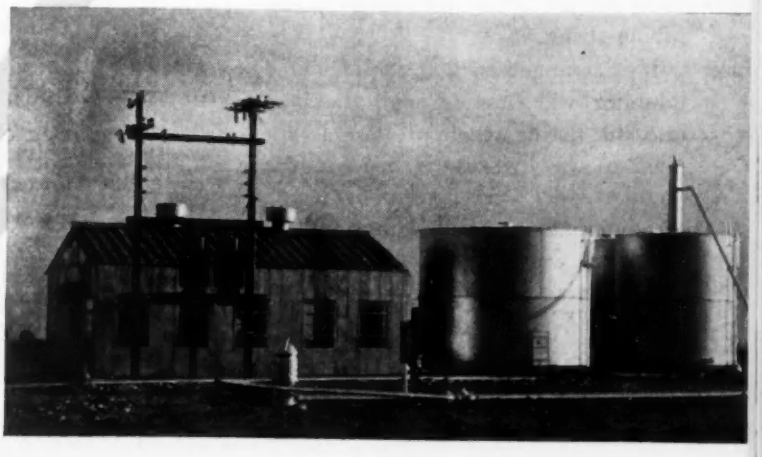

used for deck load on a steel barge or towed as an individual barge.

It also could afford storage for rig fuels, water, crude or drilling mud. Another use would be as an emergency production tank during completion, workover or during repairs to permanent storage facilities. A repair kit is furnished with each tank so that repairs can be made easily at tank location. The problem of thieving and gauging the tanks when used for oil storage is now being worked on.

Corrosion

BOLTED REINFORCED PLASTIC TANK.[14] Synthetic materials, such as plastics, vinyls and rubber, are being utilized more and more as an aid in combating corrosion of structural metal or as a substitute for metal parts, whenever possible, where corrosion is extremely severe. Such a case is the erection of the first 250-barrel bolted fiberglass-reinforced plastic tank, used in oil field service as a part of a salt water disposal system in Oklahoma.

Dimensions of the plastic tank are the same as for those of an API bolted steel tank, except for the thickness of the sections. The plastic is not affected by corrosion, and the bolts are protected in molded plastic. Erection follows about the same pattern as for a bolted steel tank except that care must be taken in handling the various parts since the plastic, although quite flexible, can be broken.

BOTTOM-HOLE CHEMICAL INJECTOR.[15] One of the most recent contributions to the control of the corrosion problem in gas-condensate wells is the successful use of a bottom-hole chemical injector valve. This valve permits an inhibitive chemical to be administered to the producing equipment without interrupting the production schedule of the well. This injector is a pressure differential type valve normally set just above the packer in the tubing string.

It is arranged so that the chemical inhibitor will flow through the port into the tubing when pressure is applied to the hydrostatic head in the annular space sufficient to overcome the spring setting in the valve. In preparing the well for bottom-hole chemical treatment after the injector equipment has been installed in the tubing string about two joints above the tubing-casing packer, the annular space is washed free of mud and filled with a mixture of 39 parts distillate, normally of the same type as produced by the well, and one part of liquid organic inhibitor.

A similar mixture of the distillate and inhibitor can then be injected into the annulus to be forced into the producing stream of the well. The amount of such injection is controlled by the pressure maintained on the injection pump installed at the surface. Normal treatment usually runs about 40 gallons of mixture per day.

Automatic Controls

AUTOMATIC FLUID METER.[16] Proven in field operation and in accuracy of measurement is a new automatic fluid weighing system for gauging crude oil production. Fluid and gas from one or more wells enters a conventional separator. The fluid dumps into a line connected into the surge tank and weigh tank. If the weigh tank is emptying, the flow is directed into the surge tank until the inlet valve on the weigh tank opens. When this valve opens, fluid enters the weigh tank until a predetermined weight of fluid has been added to the tank. Then the inlet valve closes and the discharge valve opens, and fluid flows out of the weigh tank until the same predetermined weight has been removed.

This system measures oil production by metering a pre-determined weight of oil per cycle rather than by volume. Conversion to volume is obtained by dividing the weight metered over a given period by the density of the oil. To arrive at an average density the apparatus automatically thiefs a sample of the oil on each cycle and the density of this composite sample is obtained. Its accuracy is unaffected by paraffin accumulations in vessels or by temperature variations of the crude.

General

HIGH-SPEED COMPUTING MACHINES.[17] Considerable progress is being made in adapting electronic computers to solving reservoir engineering and research problems, and to performing high speed computations of various routine calculations where the volume of work justifies their use. The main interest in these machines is the speed with which complex problems in producing behavior of reservoirs can be solved for use in future reservoir control.

Application of the machines to reservoir problems is still rather limited. But their use in figuring orifice meter charts, stock tank production and other routine calculations is becoming more widespread. Some indication of their potentialities was demonstrated by their use in tabulating votes in the recent national election.

Once the initial machine set-up has been made, a substantial amount of man hours can be saved. And the punch card system provides a compact, uniform and readily accessible file system. The punched cards are being used by some companies as files on inventory of production equipment and for various phases of production and reservoir data.

Other Developments

It may be well to point out that the above discussion does not by any means represent all of the new production methods that were developed in 1952. Rather they may in some sense represent a general cross section of the advances made.

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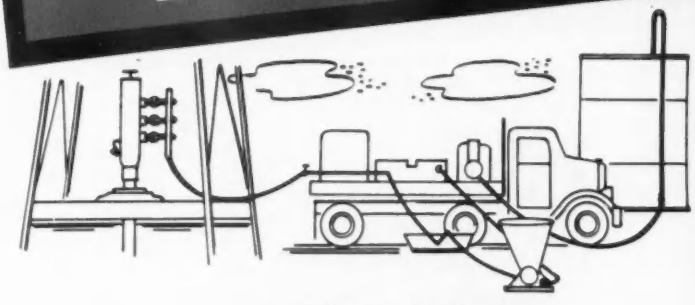
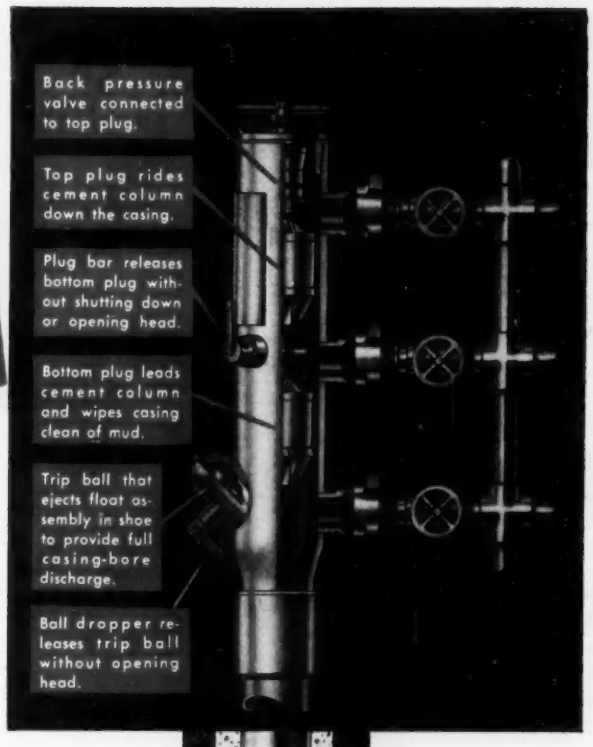
ACKNOWLEDGMENT

This paper presented to the Houston Chapter, API, Houston, Feb. 3, 1953.

From HEAD to SHOE




Back pressure valve connected to top plug.
Top plug rides cement column down the casing.
Plug bar releases bottom plug without shutting down or opening head.
Bottom plug leads cement column and wipes casing clean of mud.
Trip ball that ejects float assembly in shoe to provide full casing-bore discharge.
Ball dropper releases trip ball without opening head.

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The cement is completely and effectively segregated from well fluids by two closely fitting plugs which are positively and simply released at the proper time by mechanical means from outside the cementing head.

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Cementing head is never opened from the time cementing operations begin until they are completed. It is impossible for air pockets to form in either the mud or cement column.

FULL CASING DISCHARGE

Float assembly is pressure-ejected from the float shoe by the trip ball after casing string has been floated to position. This unrestricted opening reduces the load on the pumps . . . circulates greater volume with same pump pressure and results in higher velocity in space between casing and bottom of hole.

POSITIVE FLOW-BACK

When the back pressure valve, which has traveled down with the top plug, latches in the stall collar, it positively prevents flow-back of cement. Operator may bleed the pressure back to zero and leave the well open or close it in at final runnjng pressure.

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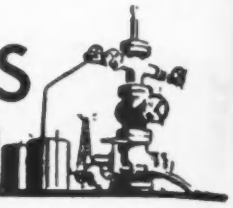

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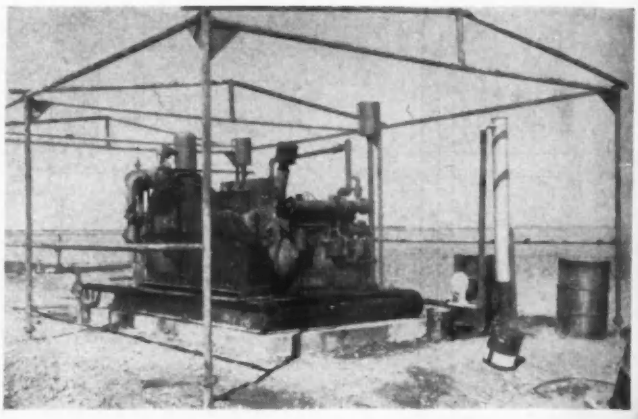
Enclosure Aids In Oil Heating

In the handling of viscous crudes, it is sometimes necessary to heat the oil to increase flow characteristics. This is particularly true in severe winter weather. In order to obtain maximum efficiency from the indirect tubular heating units, and also to keep associated equipment such as valves and regulators from freezing, the heaters were completely enclosed as illustrated. In addition, a 12-foot stack was added for better draft.

For fire prevention reasons as well as to provide some insulation, an asbestos-cement board was used. These were cut to size by hand saw and fastened to angle iron frames placed around each unit. A small gable in the roof of the enclosure helps shed water. The stack was braced by small diameter pipe or salvaged sucker rods. Control valves for the flow lines and fuel lines were located on the outside of the enclosure. Side boards may be removed easily should it be necessary to move or repair one of the crude oil heaters.

Compressor Housing Is Removable

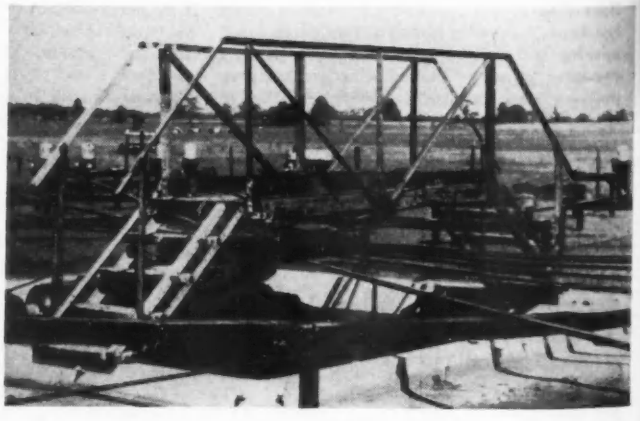


Housing for the compressor plant at a lease may be fabricated from two-inch pipe scraps usually found around the lease. Main feature of this structure is that bolted flanges are placed near the ground on all the risers so that the entire building may be "unflanged" and moved in one piece.

The building was fabricated in the welder's shop with the usual four corner posts and one post in the middle on the long side. Runners are then welded around the top and one in the middle along the long side to hold the sheet iron. Beams are made from more scrap material by simply bending three joints of two-inch pipe in the middle and laying them over the tops of the corner posts and the middle posts. A short riser is then fitted in the middle to support the roof gable.

Threads on the bottom of the posts screw into flanged unions with three-foot nipples protruding which are cemented into the ground. Whenever it is necessary to move the building, the flanges are unbolted and the entire building is free to be moved.

Walkway Is Safety Feature of Pit



Addition of a metal walkway over the eccentric pit of a central power installation for rod pumping oil wells increased the safety features to the operator. Numerous drawbars made it dangerous for the pumper to cross each time a rod line was hooked on or off, and the addition of this walkway permits the pumper to work safely among the mass of drawbars.

Made from salvaged galvanized steel walkways for tanks, this installation spans the concrete pit erected

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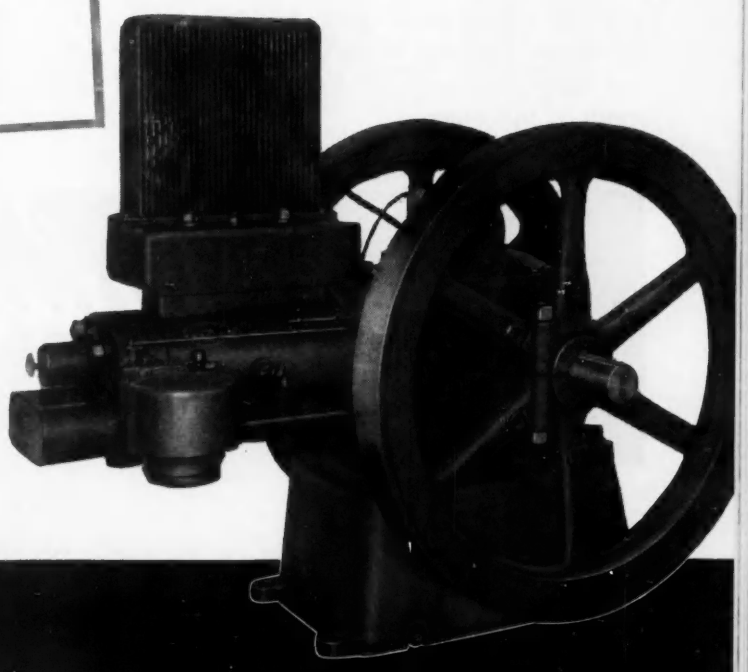

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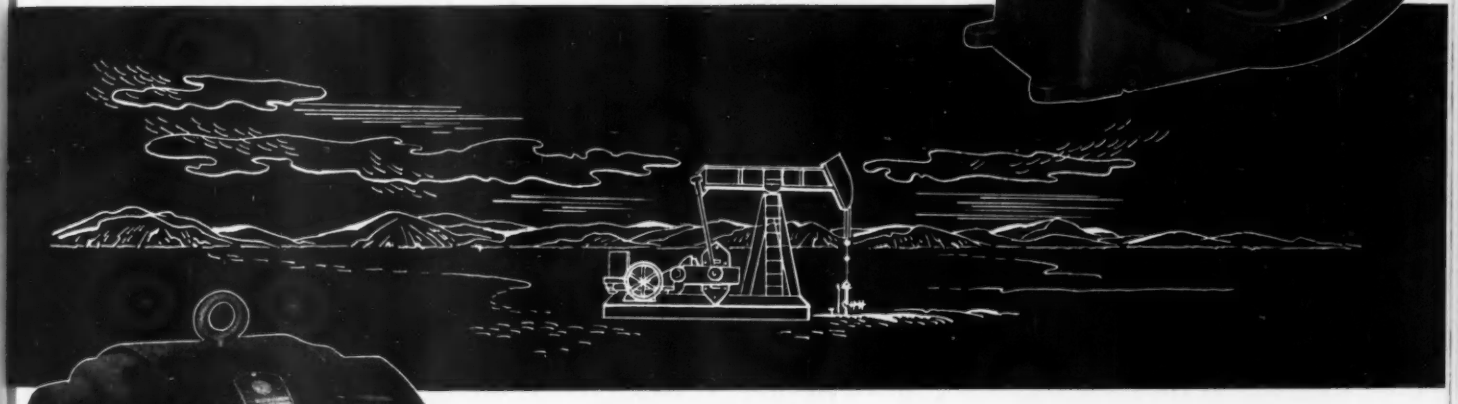

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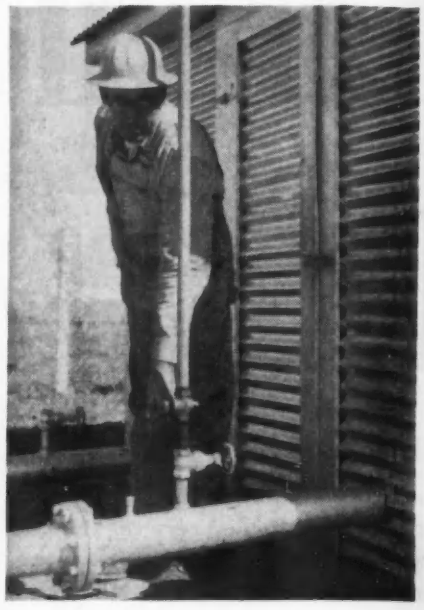
around the eccentric and gear box of the central pumping unit. It was made high enough so that no part of the eccentric could strike the walkway, but low enough so that the unit could be serviced or a drawbar could be disengaged when desired. It is anchored to the concrete wall at each end by a piece of metal angle iron, and can be removed easily. Handrails add to the safety of the walkway, and the installation has proved its worth in operation.

Steam Whistle Is Lease Signal

Where high pressure gas is available for gas-lifting, one company makes use of it for signalling between the gauger and pumpers and between pumpers. It is only necessary to install a collar on the gas line and connect a valve and riser to make a connection for the whistle.

Any ordinary steam whistle which is used around boats and trains will do. It is connected to the top of the riser so that the sound will be carried all over the lease.



The whistle is mainly used by the pipe line gauger to let the pumper know when he is on the lease. When he is ready to put a tank on the line, he blows the whistle and by the time he has the tank gauged, thiefed, and the sample shaken out, the pumper will have plenty of time to complete whatever he is doing and come by the tank battery in time to sign the run ticket.

The whistle is also used between the lease foreman and the pumpers in case the foreman wants to "buzz" them to get a certain job done in a hurry. Of course, the whistle is always available in case of emergency and a series of short blasts is a warning to come running with fire extinguisher equipment.

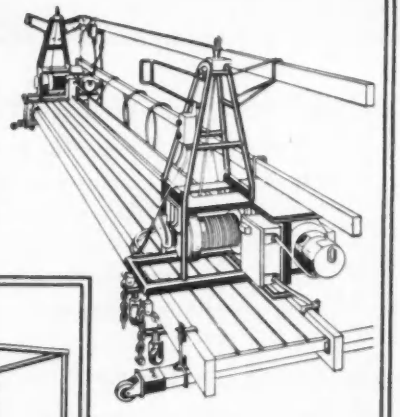
Air Tongs Loosen Control Head Ram

In reworking wells equipped with the ram type tubing control head, it is usually found that the rams are most stubborn about being run in and out by hand. This is particularly true if the rams have not been operated for months and perhaps years. When commencing workover operations, it is always desirable to make sure the tubing control rams will function easily in case they might be needed, and needed badly.

Faced with the time-consuming and

ALUMINUM DIAMOND PLATE DECK PLATFORM

Platform as shown may be used as a 6, 16, 22 or 28-ft. swing stage. Platform consists of two 6-ft. and one 16-ft. sections. Can be used as a swing stage, single stirrup or basket. Air or electric operated.



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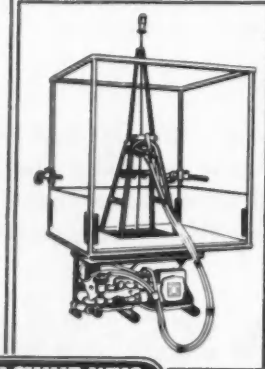

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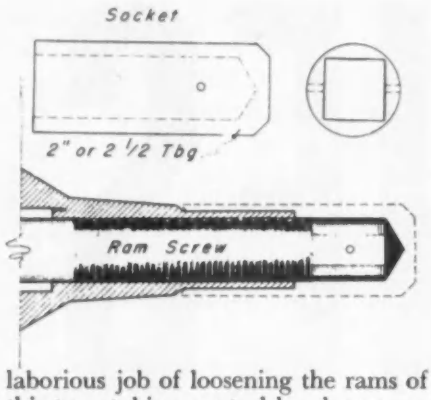
LOOK FOR THE GREEN RODS



laborious job of loosening the rams of this type tubing control head, one operator devised a simple socket that could be placed over the square shoulder of the ram screw. This socket was of sufficient length so that air-operated tubing tongs could be placed over it and the ram screws run in and out until they were easily rotated.

Diagram of the socket is illustrated. It can be made from 2- or 2½-inch tubing, and should be at least 15 inches long to allow ample space for the air tongs to operate in a vertical position. A square recess is made into the end of the socket so that it will fit over the 1½-inch by 1½-inch square end of the ram screw. A ¼-inch bolt should be placed through the socket once it has been inserted on the ram screw to prevent it from being thrown off.

By use of the automatic air-operated tubing tongs that take a "bite" on the socket, the ram screws may be run in and out and lubricated until they are free. The short time spent is well worth the effort in case the rams are ever needed.

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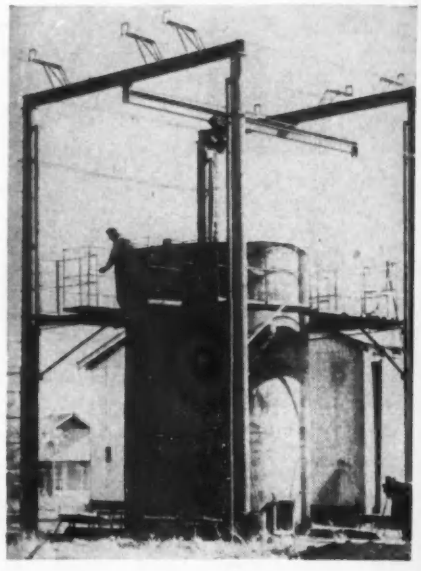
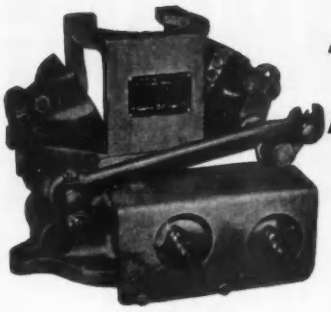


Elevated Rack Aids Tank Reclamation

A four-legged rack has been constructed as an aid in reclaiming lease stock tanks that are corroded or found leaking. It permits the complete and safe repair in minimum time, and provides easy access to all parts of the tank, inside and out.

Measuring about 18 feet high, four corner posts were made from eight-inch casing and joined across the top by H-beams. An H-beam straddling the two beams was suspended on rollers that fitted into the bottom web of the two parallel beams. This construction permitted the cross beam to be moved across the top of tanks under repair. A chain hoist was supported by the spanning beam as shown.

Two adjustable platforms which fitted around the tanks were supported on vertical tracks made of two-inch pipe welded to the larger posts at bottom and top. A sliding section of the platform base was made of 2½-inch pipe so that it fitted easily over the track. Holes located at 24-inch intervals in the track allowed the platform to be positioned at the most convenient height for repairs on the tank. These platforms were positioned



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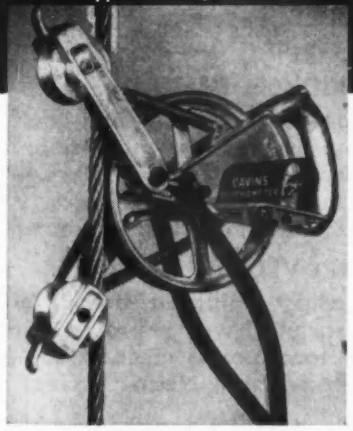

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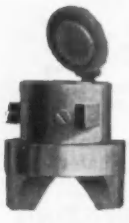
Miller Sand Pumps are made in regular and heavy duty types with lug type sand, chisel and bailer bottoms which are easily interchangeable. Threaded type bottoms that do not have to be removed to dump sand pump are available.

SAND PUMP SIZES

Outside Diameter

2½"
3"
3½"
4¼"
5"
5½"
7"



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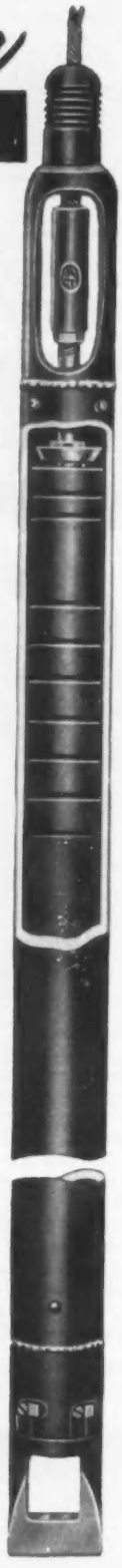
20 feet
25 feet
30 feet

Special Sizes and Lengths Made to Order!

Write for descriptive price list on Miller Sand Pumps and regular and sectional bailers. See Composite Catalog Page 3365 for details.



Chisel Bottom Illustrated

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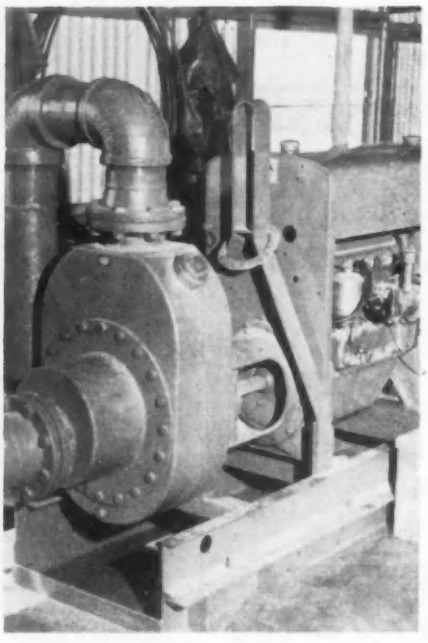
by means of the chain hoist. In this manner, the tank could be cleaned from bottom to top and painted easily and safely. Handrails around the platforms serve as safeguards for workmen on the platforms.

To coat sucker rods with vinyl plastic, extending racks were added to the two paralled H-beams as shown. From the platforms that can be racked up or down, the rods can be cleaned and painted.



Lift Bail on Pump Is Quick Weight Hoist

When light equipment is unitized, a lift bail can be located at the weight center to make quick use of hoisting lines and lifting machinery. Use of such lifting bails also eliminates having to string tie lines around the unit. In this case, only a hook on a lift line is needed to hoist the centrifugal pump and driving engine from one place to another.

The lift bail was made of ⅜ x 2½-inch strap steel, bent to the shape illustrated. Top of the bail extended above all parts of the unit when completely disconnected from suction and discharge piping. The bail was anchored to the skid on both sides by two bolts inserted through lifting lugs welded to the skid base at the weight center of the unit. The suction and discharge lines are connected by bolting up flanges.

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Reda Pumps are accepted as original equipment, or replacement equipment, because they produce at a lower cost per barrel of fluid. Whether it's large volumes from shallow depths, or modest volumes from great depths, Reda Pumps provide operating savings.

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Constant research and design improvement are responsible for lengthened operating life; corrosion resistance, low labor cost per barrel of fluid produced.

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Greatly improved overall efficiencies have improved Reda performance as much as 25%; a substantial operating saving.

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BARTLESVILLE, OKLAHOMA

U. S. Pipe Lines

to Have 13,910 Added Miles

By **DONALD M. TAYLOR,** WORLD OIL Staff

AN INCREASE in pipe line construction lies ahead for the U. S. in 1953. WORLD OIL predicts that the year's end will see 13,910 miles of new pipe lines placed in operation. This compares with 13,247 miles for 1952.

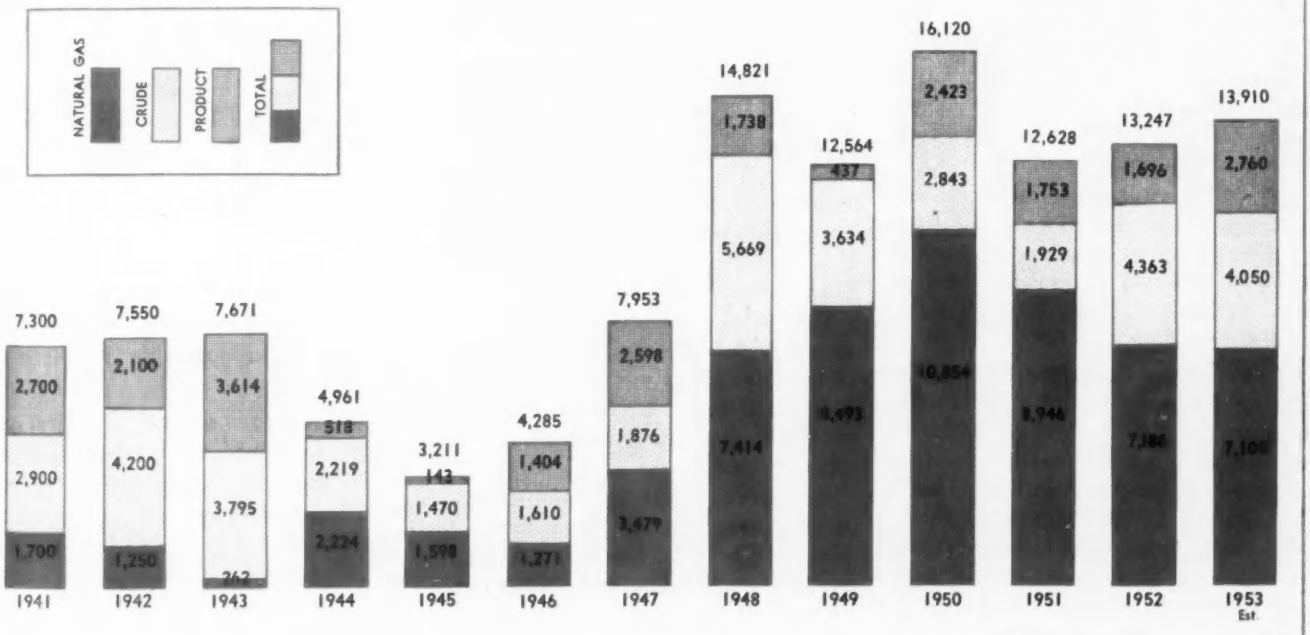
These facts emerged when WORLD OIL asked 203 pipe line companies these questions: "How many miles of four-inch and larger pipe lines (excluding corporate distribution lines) did you place in operation in 1952? How many miles do you think you will place in operation in 1953?"

Results of the poll were combined with facts from PAD, FPC, and other sources to arrive at the slightly less than 14,000 miles of new lines for the coming year.

The poll proved that WORLD OIL was remarkably accurate when on February 15, 1952, it predicted "slightly more than 13,000 miles for the year. Were it not for the steel

UNITED STATES PIPE LINE CONSTRUCTION

(MILES COMPLETED)



YEAR	MILES OF NEW PIPE LINE PLACED IN OPERATION*				MILES OF LINE BUILDING OR AUTHORIZED AT YEAR END†			
	Oil	Product	Gas	Total	Oil	Product	Gas	Total
1952.....	4,363	1,696	7,188	13,247	4,604	3,608	13,933	22,145
1951.....	1,929	1,753	8,946	12,628	7,182	4,368	18,473	30,023
1950.....	2,843	2,423	10,854	16,120	5,366	3,288	23,934	32,588
1949.....	3,634	437	8,493	12,564	2,663	2,055	21,740	26,499
1948.....	5,669	1,738	7,414	14,821	4,779	42	15,323	20,144
1947.....	1,876	2,598	3,479	7,953	2,715	1,386	9,790	13,891
1946.....	1,610	1,404	1,271	4,285	2,099	2,638	4,771	9,508
1945.....	1,470	143	1,598	3,211	831	882	248	1,961
1944.....	2,219	518	2,224	4,961	112	....	286	398
1943.....	3,795	3,614	262	7,671	848	....	1,423	2,371
1942.....	4,200	2,100	1,250	7,550	1,147	428	140	1,715
1941.....	2,900	2,700	1,700	7,300	322	....	446	768
1940.....	1,615	575	810	8,000	457	450	243	1,150
1939.....	3,155	840	305	4,300	460	589	171	1,220

* Includes all lines completed during the year. † Mileage on all types of pipe lines on which construction was still underway at end of year, plus mileage of new lines authorized or planned.

shortage, the total would exceed this figure."

The prediction was true on both counts. A steel shortage did prove to be the ruling factor in limiting 1952 construction to 13,247 miles. Work on several projects was delayed because of shortage of line pipe; and yet this was the third highest total of new lines placed in operation inside the continental U. S. in one year's time.

Of this total, 4363 miles were crude lines (including 1322 miles of four-inch and larger gathering lines). This fell slightly below the predicted figure of 4500 miles for the year. Still, it was more than twice the mileage of 1951.

A large part of this expansion of crude lines was aimed at increasing capacities of systems along existing routes. Old lines were looped and, in many cases, removed and salvaged as well. Some of the important new crude systems placed in operation during the year were: The Texas Pipe Line Company's 22-inch from Houma, La., to Port Arthur, Texas; a portion of Sinclair Pipe Line Company's line from Drumright, Okla., to East Chicago, Ind.; Platte Pipe Line Company's 16 and 20-inch line from Wyoming to Illinois; and Service Pipe Line Company's looping system.

The 1952 total of products lines ran about as expected with some construction curtailed or postponed because of the steel strike. The total for the year was 1696 miles of new lines placed in operation.

Gas systems expanded 7188 miles during the year (including 1495 miles of gathering systems). This reflects a definite downward trend in new construction as compared with 8946 miles for 1951 and 10,854 for 1950. Actually, the 1952 total represents a normal yearly growth, with the gas industry developing markets in depth—rather than racing for new franchise territory.

On the whole, 1952 was a year of commonsense pipe line construction. Most jobs were completed under ideal weather conditions and most contractors made substantial profits. However, the bidding was competitive and a few individual contractors sustained heavy losses.

1953 Forecast

Should the tempo of the war increase or its infected areas spread, defense would gobble up a lion's share of the steel plate now earmarked for line pipe. This would mean that many projects planned for the year would wither on the vine.

On the other hand, should FPC give early approval to several long line gas systems now on the docket, the forecast would be low. For the engineering and system plans are complete in most cases—even to the extent that material purchase orders are already in the hands of manufacturers awaiting only the blessing of FPC. Also, three long line crude and products transmission projects will fire up when financial arrangements have been completed.

If several of these jobs get under way soon, mid-summer will likely find sections of the lines being laid. And the total for the year will soar another thousand miles at least.

Yet, despite these uncertainties, World Oil predicts that 13,910 miles of new lines will be added to the growing network of U. S. pipe lines. Of this total, 4050 miles will be crude lines (including 1610 miles of gathering lines); 7100 miles will be natural gas transmission lines (including 2000 miles of gathering lines); and 2760 miles will be products carriers.

The latter figure is an increase of 63 percent over the 1696 miles of products lines placed in operation in 1952. This trend stems from the warm support PAD has given any line, during recent years, which can carry aviation, motor and truck fuels to important industrial and strategic defense points. Also, products lines have been proving profitable as a carrier capable of transporting fuels more economically, enabling shippers to place their products in market areas on a competitive basis.

A portion of the 1953 construction is a slopover from work originally planned for 1952 but delayed by the steel shortage. One of the remarkable features of the expansion is that most of the new additions will be of short length.

Gas Lines

Construction of natural gas lines will be less for this year than last. Most of the presently authorized construction will consist of additional gathering facilities to pull in new reserves, loops to increase system deliveries, and lines to link systems with underground gas storage reservoirs.

As for the new long line transmission companies whose plans are awaiting FPC approval, one or more will likely be approved during the year. The burden of the planners is to prove that a market exists, that reserves for 20 years' operation are tied down, and that the projects are economically sound. The hungriest market is the Pacific Northwest with its atomic manufacturing plants which require copious quantities of fuel. Several groups are trying to win the franchise: Glacier Gas Company of Butte, Mont., proposes to bring the gas from Alberta, Canada; Northwest Natural Gas Company of New York, proposes to do the same; and Pacific Northwest Pipeline Corporation of Houston proposes to link the Northwest with the San Juan Basin. The prospects of the first two companies seem dim in view of Canadian Board of Transport Commissioners to approve Canadian gas exports.

Two other companies, Gulf Interstate Gas Company and Texas Ohio Gas Company, both of Houston, are awaiting FPC permission to run lines to Eastern market areas.

Most other proposed construction projects are designed to increase capacities of existing systems.

Crude Lines

As with natural gas lines, most new construction of crude pipe line will be for the purpose of increasing deliveries along existing routes. The vast reserves of the Permian Basin have yet to find adequate outlet—although this problem will be less acute when the Rancho and West Texas Gulf lines go into operation in the next few weeks.

Several new sources of crude are being developed, calling for additional lines. Inasmuch as the fields are being developed by many companies, rather than a few, it is likely that the pipe lines which will furnish outlet for the oil will be joint ventures or "participating ownership" ventures. This enables companies to jointly construct one large line which can more efficiently move crude than several small lines of the size individual companies could afford to construct.

Little slackening in pipe line construction is ahead in the immediate future with about 22,000 miles of gas, products and crude lines planned. It is unlikely that a small business recession which some have predicted for next summer would have any effect whatever on pipe line construction during the next 12 months.

Thirtieth Anniversary

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Crude, Products and Gas Lines Planned in 1953

By ALICE L. GIVEN, WORLD OIL Staff

CRUDE

Cities Service Pipe Line Company will commence laying pipe this spring for 64 miles of 20-inch pipe between Sour Lake, Texas, and Sulphur, La. Associated Pipe Line Contractors, Inc., Houston, has the contract for the job.

Gulf Oil Corporation began work early this year on a 22-mile, eight-inch crude oil pipe line from the Portilla field, Nueces County, Texas, into Corpus Christi where it will deliver to the Pontiac refinery. The transmission capacity is rated at 10 to 12,000 barrels daily. This $300,000 line is expected to be in operation in April.

Interprovincial Pipe Line System proposed an extension of its network to extend from Superior, Wis., to Sarnia, Ont., to supply the refinery there. The extension would be a 625-mile, 30-inch line across northern Wisconsin and Michigan to the Mackinac Straits and then southward through Michigan to a crossing on the St. Clair River near Sarnia. Initial transmission capacity would be 85,0000 barrels daily with a possible 300,000 barrels capacity through additional pumping stations. This system has been approved by PAD and pipe set aside so that the company may aim at a fall, 1953, completion date.

Lake Head Pipe Line Company has scheduled construction on 190 miles of 30-inch pipe line between Ironwood and Gook, Mich., to begin in May or June. This job will be handled by Anderson Bros. Corporation, Houston.

Magnolia Pipe Line Company plans to construct a new 47-mile 4-, 6-, and 8-inch crude pipe line in Andrews County, West Texas, originating in the Nolley field and extending to the new Magutex field. From there it will move through the Midland farm area to connect with Magnolia's main line from the Fullerton field to Midland station.

Pure Transportation Company, subsidiary of The Pure Oil Company, plans to link western Nebraska and neighboring oil pools with the new large diameter Platte Pipe Line System. Preliminary construction schedules call for the eight-inch, 45-mile pipe line to go in early this year. The line will originate in Kimball, Neb., where it will serve the South Kimball pool, the Enders, Goodwin and southwest Potter pools, as well as other neighboring pools. This line will have a daily capacity of 25,000 barrels, and will move south of Potter to Gurley, Neb., where crude will enter the Platte Pipe Line.

Service Pipe Line Company of Tulsa, plans to build 170 miles of 12-inch pipe line to tie in to the Beaver Lodge field as well as newly discovered fields. It will make delivery at a point near Tioga, N. D., and will serve a new refinery to be built near Mandan. Original capacity of the line is estimated at 15,000 barrels daily.

Trans Mountain Oil Pipe Line Company is scheduled to begin construction of a 30-mile, 24-inch extension into the U. S. from its Canadian terminus at Sumas, B. C. The U. S. extension is being planned and designed by Canadian Bechtel Limited and will extend southward to Seattle, with a spur serving the Ferndale, Wash., refinery which will be completed in 1954. The Canadian section of the system, 700 miles of 24-inch crude transmission line, is scheduled for completion in August. The U. S. extension, with a capacity of 200,000 barrels of crude daily, will be completed in 1954 and is estimated to cost $2¾ million. Construction on the Canadian section is being carried on by Comstock Midwestern Limited, Toronto, Canada, and Mannix Limited, Calgary, Canada.

West Coast Pipe Line Company was scheduled to receive pipe in January for construction of 960 miles of 24-inch pipe line which will stretch from Wink, Texas, to Norwalk, Calif., when it is completed late this year. Construction duties for the line have been assigned to Ebasco Service Inc., New York. This project is cited by many as a necessary overland link with the Pacific Coast in case of national emergency, and received early priority from PAD. The project is estimated to cost $66 million.

PRODUCTS

Buckeye Pipe Line Company was expected to complete the first leg of its new products system between Linden, N. J., and Allentown, Penn., this month. This section is of 16-inch pipe. At Allentown, the Buckeye system will join Tuscarora Pipe Line Company's line for trans-shipment to terminals west of Allentown as far as Pittsburgh. Proposed extensions will link the towns of Marcus Hook, Penn., Binghamton, Syracuse, Osewego and Rochester, N. Y. Total mileage for the system will be about 430 miles with an initial capacity out of Linden of 80,000 barrels a day, and 28,000 barrels daily being delivered from Marcus Hook.

Bell Oil & Gas Company, Tulsa is planning construction this year of 150 miles of 6- and 8-inch products pipe line between Ardmore and Cushing, Okla., where it will tie into the Great Lakes Pipe Line Company system for movement northward. The cost is estimated at $3 million. The line is expected to be put in operation late this year.

California-Oregon Pipeline Company is surveying the 103 miles of its proposed pipe line route between Crescent City, Calif., and Medford, Ore. The company plans to establish a six-inch common crude oil carrier.

Continental Pipe Line Company has announced plans to build a 600-mile, eight-inch products pipe line between Billings, Mont., and Spokane. This system will be known as the Yellowstone Pipe Line and will have an ultimate capacity of 25,000 barrels of oil daily. Construction will get underway as soon as government approval is secured.

Evangeline Products System, owned jointly by The Texas Company, Texas and Gulf Refining Company and Sinclair Pipe Line Company, will see construction on its 196 miles of 16-inch pipe line early this year. The system will connect Port Arthur, Texas, and Baton Rouge, La. Line pipe for this system was scheduled to be laid early in 1953, with completion anticipated during the summer of 1954. Sinclair will deliver to the carrier through a Houston to Port Arthur line which will be constructed simultaneously with the Evangeline line, and deliveries will be made to Plantation Pipe Line Company at Baton Rouge.

Harbor Products Pipe Line System which will connect Philadelphia and Trumbley Point, N. J., with an 86-mile, 16-inch pipe line is jointly owned by Sinclair Pipe Line Company, Gulf Oil Company, and The Texas Company, Sinclair will hanldle construction details.

Indiana Farm Bureau Cooperative is building 176 miles of eight-inch line from Mount Vernon to Jolietville, Ind., and contracted Mary Construction Company, Cape Girardeau, Mo., to do the work. This job was only partially completed at the end of 1952.

Phillips Petroleum Company has announced three projects to be constructed this year. A 14-inch products line from Odessa to Borger, Texas, will be completed by May, and a 28-mile, ten-inch products line from Bayou Plant and extending to Adams Terminal, Houston, will be in operation by July. In August the company hopes to complete a 52-mile, ten-

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PIPE laying is rough even under favorable conditions. But when you have to handle extra-heavy pipe through mud and muck, as in the above picture, the extra staying power of the Caterpillar D7 Tractor with MD7 Pipe Layer really pays off. The Cat outfits on this pipeline construction job in Texas are owned by the Oklahoma Contracting Corp. of Dallas.

Built to take the extreme strains of pipe laying and stand the grind of working days on end with little rest, these Caterpillar D7 Diesel Tractors with MD7 Pipe Layers are the units preferred by experienced operators, like A. B. Knipe, welding foreman on this job. He says, "We can always depend on Caterpillar-built machines to pull us through."

Balanced Caterpillar engineering matches power output to the job. Conveniently placed operating controls, separate load and boom line drums and clutches, and a special, long-lived Caterpillar transmission, mean accurate control—and "built-in" safety for the men on the job.

You get a valuable "plus" with Caterpillar equipment: quick, on-the-spot service from your Caterpillar Dealer wherever your job goes. He carries a full line of factory parts, because only genuine Caterpillar parts can give genuine Caterpillar performance. He'll be glad to talk over your equipment requirements. Why not give him a call today?

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inch products line from the Shell Brookshire station to the Sweeny refinery. In addition the company has scheduled 200 miles of 2- through 30-inch gathering lines in Upton, Midland, Glasscock and Regan counties, Texas, for completion this year.

Pioneer Pipe Line Company is continuing construction of its products line from Sinclair, Wyo., to Salt Lake City. The 150-mile section between Evanston and Rawlins, Wyo., was completed last year with 160 miles between Rawlins and Salt Lake City to be constructed this year and tied into Salt Lake Pipe Line Company's system near Salt Lake City. Initial capacity of the line will be 12,000 barrels daily. Construction will be carried out by R. H. Fulton & Company, Lubbock, Texas. The line is owned jointly by Continental Oil Company and Sinclair Oil Corporation.

Sinclair Pipe Line Company expects to complete 45 miles of 12-inch products pipe line extending from Pasadena, Texas, to the Trinity River, in the immediate future. Rumsey Bros. Pipe Line Construction Company, Wichita, is contractor for this section which is part of Sinclair's new line from Houston to Port Arthur, Texas.

Standard Oil Company of California and its subsidiary Salt Lake Pipe Line Company, are carrying forward plans for construction of a 140-mile products pipe line originating at Pasco, Wash., and extending to Seattle. Initial capacity of the line will be 12,000 barrels daily which it will acquire at Pasco through a connection with the Salt Lake Pipe Line which terminates there. This $4.5 million project is expected to be in operation later this year.

Standard Oil Company (Ind.) has begun work on 306 miles of 12-inch products line from the Sugar Creek, Mo., refinery to Dubuque, Iowa, where it will connect with the existing Whiting, Ind., to Moorhead, Minn., line. The 120-mile section from Sugar Creek to Unionville, Mo., is under contract to Sheehan Pipe Line Construction Company, Tulsa, while the remaining 186 miles from Unionville to Dubuque is being handled by O. R. Burden Construction Corporation, Tulsa. In addition the company proposes to build a 243-mile, 10- through 12-inch pipe line from Whiting, Ind., to River Rogue, Mich.

Sun Pipe Line Company has announced two construction projects for 1953. An eight-inch products line is planned to link Sarnia, Ont., with London, Hamilton and Toronto. The products will be secured from the new Sun Oil Company refinery scheduled to go on stream this fall.

A 45-mile products line with eight-inch diameter will extend from Toledo to River Rogue, Mich., near Detroit, to relieve the existing line for transmission of crude to flow to the Sarnia, Ont., refinery.

Texas Pipe Line Company began work in January on a 34-mile, six-inch Butane pipe line between Sour Lake and Port Arthur, Texas. Houston Contracting Company, Ltd., Houston, is doing the work.

United States Pipe Line Company scheduled an early 1953 start on construction of 1600 miles of system which will connect Port Arthur and Newark, N. J., and serve many communities along the route. C-R-C Engineering Company, Houston, is building the $140 million network which will link major cities in Texas, Louisiana, Arkansas, Tennessee, Kentucky, Ohio and Pennsylvania. Completion of the line is scheduled for September, 1955.

Wolverine Pipe Line System will begin construction of a 200-mile, 16-inch products pipe line between Toledo and Detroit sometime this spring. Shell Oil Company is building and operating the 80,000-barrel-per-day line on behalf of Shell, The Texas Company and Cities Service Company.

Yellowstone Pipe Line (See Continental Pipe Line Company.)

GAS

Chattahoochee Natural Gas Company, Birmingham, Ala., is waiting on FPC decision for permit to construct a 70-mile system to supply natural gas to four communities in northwest Georgia. The system would connect with Southern Natural Gas Company's facilities at a point in Floyd County, Ga., and would receive 7,450,000 cubic feet of gas per day from that company. Estimated cost of construction is $1.5 million.

Chicago District Pipeline Company, Joliet, Ill., is planning to build a 35-mile natural gas transmission line in the Chicago area which would originate on the outskirts of Chicago, cross the Des Plaines River and extend to the company's existing system in Will County, Ill.

Colorado Interstate Gas Company began work January 15 on approximately 14,000 feet of six and eight-inch, and ten miles of 16-inch gathering lines for the systems near the Bivins compressor station north of Amarillo, Texas. This project is being handled by Z. J. Graham, Amarillo. In addition the company plans to build a 100-mile pipe line between Julesburg and Denver.

Columbia Gas System, Inc., application to FPC for authorization to construct about 279 miles of natural gas pipe lines and to retire about 178 miles of line is still pending. Subsidiaries involved are Manufacturers Light and Heat Company, Natural Gas Company of West Virginia, Cumberland and Allegheny Gas Company and Home Gas Company, all of Pittsburgh. In addition, Manufacturers proposed to take over all facilities and assets of Cumberland and Allegheny, which consist of 113 miles of line between Cumberland, Md., and Lewis County, W. Va.

East Tennessee Natural Gas Company, Knoxville, has received FPC authorization to construct a 100-mile extension of its 16-inch natural gas transmission system from a point near Knoxville to the Kingsport, Tenn., area, together with approximately 58 miles of various sized lateral lines. The project will cost about $5.8 million and will provide service to six Tennessee communities.

El Paso Natural Gas Company in December, 1952, petitioned FPC for authorization to construct facilities to allow transportation of an additional 400 million cubic feet of natural gas daily from points in West Texas, southeast New Mexico and the San Juan Basin area of New Mexico. The facilities would be known as the Midkiff plant and would comprise a gasoline absorption plant with compression and dehydration facilities to be located in the Spraberry area of West Texas.

Compressor capacity requested totaled 20,880 horsepower, with dehydration plant capacity of 63,450,000 cubic feet, and 3.4 miles of 16-inch pipe line to connect with the previously authorized facilities. Estimated cost of the new facilities is $2,807,702.

Work began January 20 on 50 miles of gathering system near Rankin, Texas, a 16- through 30-inch diameter pipe project previously approved by FPC. The pipe line company announced start of construction on 100 miles of 8- through 20-inch gathering line on November 17, and this project extends over to the 1953 construction record.

In addition, El Paso this year began construction of 50 miles of 30-inch line between Kingman and a point on the Colorado River near Topcock, Ariz. This section of line is scheduled for completion by March 15.

(See also Utah Natural Gas Company, controlled by El Paso.)

Fort Worth Basin Gas Company, a new organization, has proposed construction of a gas gathering system with a main line extending from near Brownwood, Brown County, Texas, into Grayson County, Texas. The gathering system would serve

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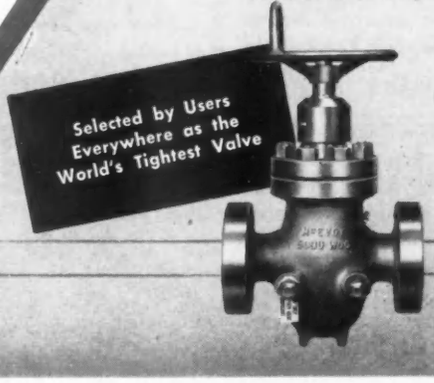

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32 counties, and the project would include gasoline plants in Brown, Parker and Grayson counties. The system would distribute gas and gas products on a nation-wide scale.

Glacier Gas Company, Butte, Mont., is still awaiting FPC authorization to build a 626 mile pipe line system in the Pacific Northwest to import gas from Alberta, Canada. Glacier, a subsidiary of Montana Power Company, would build 285 miles of 20-inch line; 120 miles of 16-inch line; 130 miles of 12¾-inch line; and 81 miles of 8⅝-inch line. Prospects for materialization of this line seem dim in view of 1952 rulings by Canadian Board of Transport Commissioners.

Gulf Interstate Gas Company, Houston, is awaiting decision by FPC on its petition to build 860 miles of 30-inch main line between Rayne, La., and Huntington, W. Va. If approval is received this spring, the company will begin construction in May, with probable completion by November, 1954. Estimated to cost $127.8 million, the line would carry 375 million cubic feet of gas daily to United Fuel Gas Company, Charleston, W. Va., through the 30-inch main line. The project includes 230 miles of 6- through 24-inch gathering lines in the southern Louisiana area, and 229 miles of various size lateral lines and five compressor stations, each with a capacity of 8000 horsepower.

Houston Pipe Line Company renewed work in February on its 40-mile, 16-inch line between Edna and Tom O'Conner gas field near Refugio, Texas. Houston Contracting Company, Ltd., Houston, is working the line.

Kansas-Nebraska Natural Gas Company, Inc., of Phillipsburg, Kan., has been authorized by FPC to construct about 196 miles of pipe line and necessary facilities to increase its total daily capacity by nearly 10 million cubic feet. This $2,576,686 project will serve four small towns and 16 new industrial customers in Nebraska and Colorado. Part of the new line will replace existing sections of the company network.

Mid South Gas Company, Little Rock, Ark., has been authorized by FPC to build a total of 191 miles of natural gas line and to acquire 38 miles of existing line in Arkansas from Arkansas Power & Light Company of Pine Bluff. The new lateral lines will supply 25 communities with natural gas. Estimated cost of construction is $4.5 million.

Missouri Public Service Company has asked FPC authorization to build 109.3 miles of main line and 27 miles of lateral pipe line in Missouri.

Nevada Natural Gas Company has received FPC permit to build 144 miles of ten-inch pipe line between Topcock, Ariz., where it will connect with the El Paso Natural Gas Company System, and Las Vegas, Nev.

New York State Natural Gas Corporation, New York, is is waiting FPC action on a request to construct 75 miles of 20-inch line, as an extension from the 20-mile line, not yet constructed, but authorized by FPC to extend from an existing system connection in Clinton County to the Driftwood gas field in Cameron County, Penn. The longer line would terminate with New York State Natural's main dual line transmission system in Armstrong County.

Northern Natural Gas Company of Omaha is ready to begin construction of 102 miles of pipe line as soon as FPC permit is given. This stretch is an integral part of its original program begun in 1952 but which was omitted in its earlier presentation to FPC as being out of FPC jurisdiction. Estimated cost of construction is $11,692,547.

Construction crews resumed work early this year, on 100 miles of 26-inch line formulating four loops in Kansas and Nebraska which were shut down in November because of bad weather, and 45 miles of 26-inch loop near Beatrice Station, Neb.

Northwest Natural Gas Company, New York City, is still awaiting FPC ruling on a 750-mile pipe line project originally submitted in 1948, and amended in January, 1952. This project concerns 18- and 24-inch transmission lines and laterals to import gas from Alberta to Oregon and Washington. The line would enter the U. S. at Lynden, Wash., and extend to Monroe, Wash., and thence to Eastport, Idaho. From Monroe the system would network Seattle and Portland. This project would incorporate four compressor stations with a total of 24,750 horsepower capacity. Prospects for approval by the Canadian Board of Transport Commissioners appear doubtful.

Oklahoma Natural Gas Company's natural gas carrier from Sapulpa, Okla., to the Grand River Dam Authority steam plant near Pryor will be under construction about March 15. The $2.25 million 18-inch line to the Pryor-Chouteau industrial areas in eastern Oklahoma will extend approximately 51 miles and will cross the Arkansas River and the Verdigris River. The line will have a capacity of 75 million cubic feet of gas daily.

Pacific Gas and Electric Company began work January 25 on 86 miles of 34-inch loop line between Topcock, Ariz., and Milpitas, Calif. Engineers Limited Pipeline Company, San Francisco, is contractor for the job, which parallels the main line from Topcock, Ariz., to Milpitas, Calif.

Pacific Northwest Pipeline Corporation is ready to begin construction of 1400 miles of natural gas transmission line from the San Juan basin to the Pacific Northwest as soon as FPC authorization is given. Adequate financing for the project has not as yet been announced. The system would collect the natural gas from the Colorado Oil & Gas Corporation in the New Mexico section of the San Juan and Oregon customers as well as those en Basin, and would deliver to Washington route.

Permian Basin Pipe Line Company, controlled by Northern Natural Gas Company, proposed to build 384 miles of 4- through 30-inch pipe line from the Permian Basin and eastern New Mexico, to Skellytown, Texas. This would include 158 miles of 4- through 26-inch gathering lines in New Mexico.

South Georgia Natural Gas Company, Birmingham, is seeking authorization from FPC to construct 339 miles of 2- through 12-inch line through southwest Georgia and northern Florida.

Southern Natural Gas Company is ready to begin construction on 525 miles of 14-, 16-, 20- and 24-inch pipe line in Georgia, Mississippi and Louisiana. Houston Contracting Company, Ltd., Houston, will begin the work in March.

H. C. Price Company, Bartlesville, contractor for another 200 miles of 24-inch pipe line which is a part of the same project, will resume construction operations in April. Price completed 16.5 miles of line last fall before being compelled to cease for the winter period. The entire project which includes 833 miles of line and loopline is scheduled for completion in December, 1953, and is estimated to cost $32½ million.

Tennessee Gas Transmission Company is seeking FPC authorization to add 107 miles of 26- through 30-inch loop along its system, as well as six new compressor stations, with a total of 51,500 horsepower being added to existing stations. The project would also include 45 miles of 20-inch line connecting Buffalo and Niagara, N. Y.

In Texas, Morrison Constructors, Austin, began work in January on 43 miles of 26-inch line between Falfurrias and Edinburg.

Texas Eastern Transmission Corporation, Shreveport, and Wilcox Trend Gathering System, Inc., Dallas, were granted FPC authorization in December to construct pipe line facilities in Texas and Louisiana. The project is aimed at reinforcing diminishing natural gas supplies in

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Louisiana. Texas Eastern will build a 315-mile, 24-inch pipe line extending from a Provident City connection with Wilcox's system to a connection with its own system near Castor, La. The Texas Eastern line, with a capacity of 140 million cubic feet daily and a possible increase to 350 million cubic feet, is estimated at $23,283,540. Trojan Construction Company, Oklahoma City, will begin construction of 80 miles of line from Center, Texas, to Castor. Williams Bros. Company, Tulsa, late in January began construction of a second 80-mile lap from Corrigan, Texas, to Center. The 80-mile stretch from Waller to Provident City will be under construction soon when Associated Pipeline Contractors, Inc., Houston, begin work there. Anderson Bros. Corporation, Houston, is laying a fourth section of line extending from Groveton to Waller.

Texas-Ohio Gas Company, Houston, is this month continuing the fight for authorization to construct a 1406-mile, 30-inch pipe line to import gas from Mexico for ultimate delivery in West Virginia and Ohio. Denied last November, the FPC decision was declared a tentative decision in December. Hearings were reopened late January. H. K. Ferguson Company, Inc., Houston, did the engineering for the project.

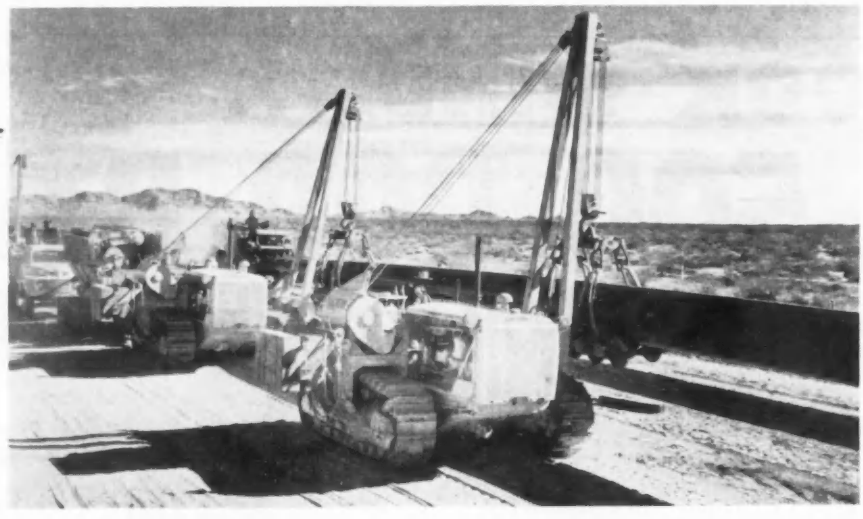
Utah Natural Gas Company, control of which was recently purchased by El Paso Natural Gas Company, has begun preliminary work on a 96-mile natural gas line connecting Clear Creek field near Price, Utah, with Salt Lake City. Construction of this $6.5 million line is scheduled for completion December, 1953. From Clear Creek to Provo, Utah, the line will be of 18-inch diameter; and from Provo to Salt Lake City the line will be of 16-inch diameter. Initial capacity of the system will be 50 million cubic feet daily, with a possible capacity of 150-million-feet upon addition of pumping stations. Utah Public Service Commission scheduled hearings on the construction for February.

Westcoast Transmission Company, Ltd., of Canada, received approval of its proposal to construct a 723-mile, 24-inch pipe line from the Peace River natural gas field to Vancouver, B. C., with a branch line extending south to the U. S. border. It is hoped the $111 million project will be completed in the fall of 1954 and preliminary work on the route was begun late last year. Actual construction will probably be held up pending favorable action by FPC regarding the line proposed by the U. S. affiliate of the same name.

Westcoast Transmission Company, Wilmington, Del., has applied to FPC for authorization to build a 349-mile natural gas pipe line to import gas at a point near the U. S.-Canadian border from the Canadian Westcoast Transmission Company. The U. S. line would extend as far south as Portland, and supply communities along the route.

Western Pipe Line Company has announced plans to build a 1200-mile, 22-inch natural gas pipe line from southern Alberta oil fields to the area near Duluth, Minn. Action by FPC or the Canadian Board of Transport Commissioners has not yet been announced.

Wilcox Trend Gathering System, Inc., Dallas, was granted FPC authorization in December to begin construction of 157 miles of 14- and 16-inch natural gas line from a point in Hagist Ranch field in McMullen County, Texas, to a connection with Texas Eastern Transmission Corporation's system near Provident City, Texas. Estimated to cost $10.5 million, the project includes about 60 miles of laterals, a 2200-horsepower compressor station and other necessary facilities. H. B. Zachry Company, San Antonio, has contracted for the job which is now under construction.



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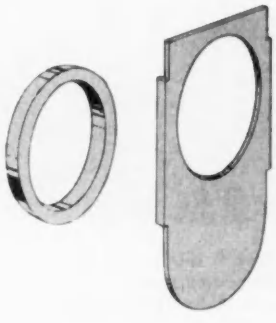

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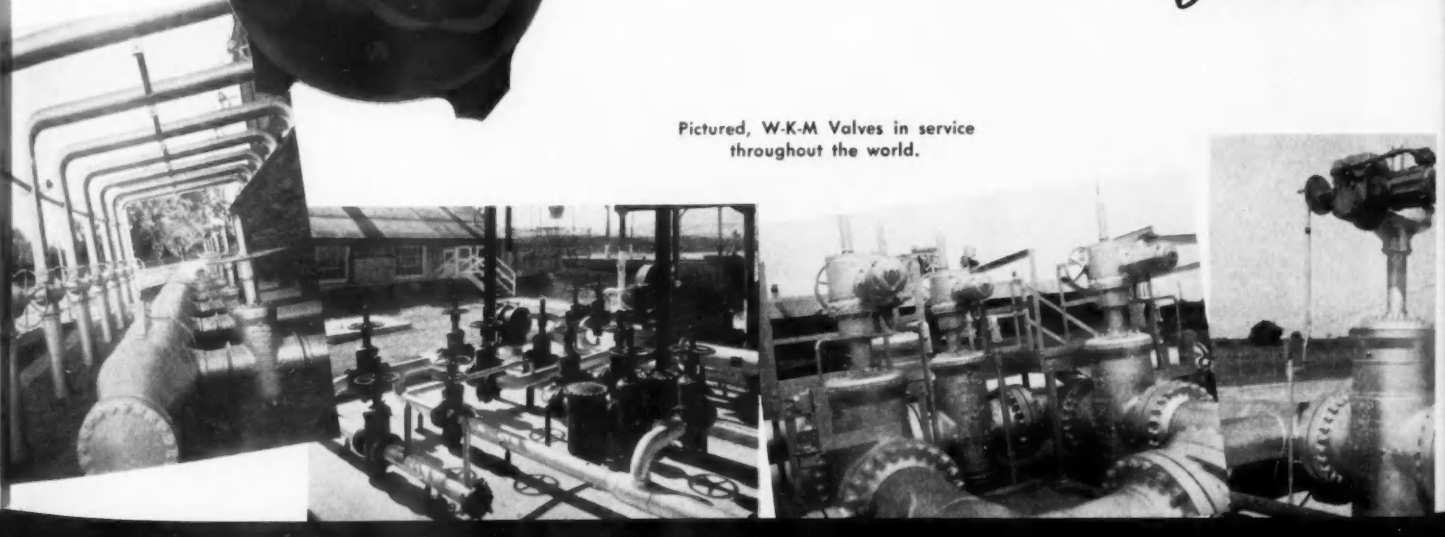

Contractors Name Officers for 1953

The convention is underway as Robert A. Conyes, left, outgoing president of the Pipe Line Contractors' Association, receives the key to the Shamrock from M. Jack Ferrell, vice president and general manager of the hotel.

ROBERT THOMAS, president of Texas-Louisiana Contractors of Fort Worth, was elected president of the Pipe Line Contractors' Association at an annual meeting which attracted a record attendance of 700 to the Shamrock Hotel in Houston last month. Thomas succeeds Robert A. Conyes, president of Conyes Construction Corporation of San Pablo, Calif.

Other officers are James P. Neill, president of Western Pipe Line Constructors, Inc., Austin, Texas, vice president; and C. C. Bledsoe, secretary-treasurer of Midwestern Constructors, Inc., Tulsa, secretary-treasurer. Directors are Earl Allen, president of Associated Pipe Line Contractors, Houston; R. P. Gregory, partner in Houston Contracting Company, Houston; C. C. Bledsoe; T. A. Hester, president of Oklahoma Contracting Company, Dallas; and G. A. Manuel, president of Williams-Austin Company, Pittsburgh.

This was the fifth annual convention of the association, which has a regular membership comprised of 42 contractors who are credited with constructing 85 percent of the pipe lines laid during the past several years. There are 11 members who furnish special services to the pipe line industry; 69 associate members composed of manufacturers, and 5 honorary members.

Three of the nation's leading pipeliners (left) meet after the first general session of convention. Left to right are: R. H. Fulton, president of R. H. Fulton and Company; L. H. Favrot, president of Houston Contracting Company and former association president, and James P. Neill, president of Western Pipe Line Constructors. Neill was elected vice president of the association. Two of the industry's top engineers, J. P. Bristow (center in photo at right), president of J. P. Bristow and Company, and S. E. (Al) Huey (far right), president of S. E. Huey and Company, chat with Houston attorney Robert Eikel.

Taking in sights on the exhibit "midway" in front of Shamrock are Hal Price, president of H. C. Price Company; Jim Cummings of Crutcher-Rolfe-Cummings, Inc., and M. M. Blackburn of Big Three Welding Equipment Company, Inc. At right, Richard A. Gump, attorney and secretary of the association, delivers a talk on "State Laws and Regulations Affecting Pipe Line Construction."

Pipe Line Men in the News

Standard Announces Personnel Changes in Sohio Pipe Line Co.

The Standard Oil Company (Ohio) has announced four personnel promotions in Sohio Pipe Line Company. Charles E. Curry, senior superintendent of the Tri-State division of Sohio Pipe Line Company and acting general superintendent of Pipe Line operations, becomes general superintendent.

Earl G. Ellerbrake, operations staff assistant, has been promoted to group supervisor of research and development. Both will have headquarters in St. Louis.

Arthur A. Dorffi, former supervisor of the Dayton-Cincinnati area of the Transportation department, has been promoted to assistant superintendent of the Tri-State division of Sohio Pipe Line Company with headquarters in Grayville, Ill. Tegner C. Johnson, former senior division engineer will become supervisor of the Dayton-Cincinnati area of the Transportation department with headquarters in Cincinnati.

H. M. McDonald Paul L. Hughen

Texas Eastern Transmission Makes Four Promotions

Four promotions have been announced by Texas Eastern Transmission Corporation. H. M. McDonald has been appointed general superintendent and Paul L. Hughen has been named pipe line superintendent. Other changes are Carl R. Sisson, who replaces Hughen as manager of the corporation's division three in West Chester, Penn., and Murrell Carlisle, who replaces Sisson as assistant manager.

Carl R. Sisson Murrell Carlisle

McDonald joined Texas Eastern in 1947 and became pipe line superintendent in May, 1948. He has served as acting general superintendent of the company since April, 1952. Hughen joined Texas Eastern in 1947 and served as assistant manager of the corporation's division one and manager of divisions four and three. Sisson became assistant manager of division two in 1951, having joined Texas Eastern in 1947. He moved to assistant manager of division three in 1952.

Carlisle joined Texas Eastern in 1948 and held positions of engineering inspector and pipe line foreman before being promoted to assistant manager of division three.

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Furnace Relieves Welding Stresses

A brick-lined furnace which can clamp around headers and piping of different shapes, is proving useful in relieving the welding stresses in station piping. Ordinarily the stresses in heavy wall pipe are more intense than those in thin wall pipe. The reason lies in the fact that the heavy pipe requires more welding passes, and each pass of the electric arc weld contracts from the intense heat of welding individually. For example, on a ¾-inch piece of pipe, the stringer bead pass is usually cool by the time the lace pass is applied.

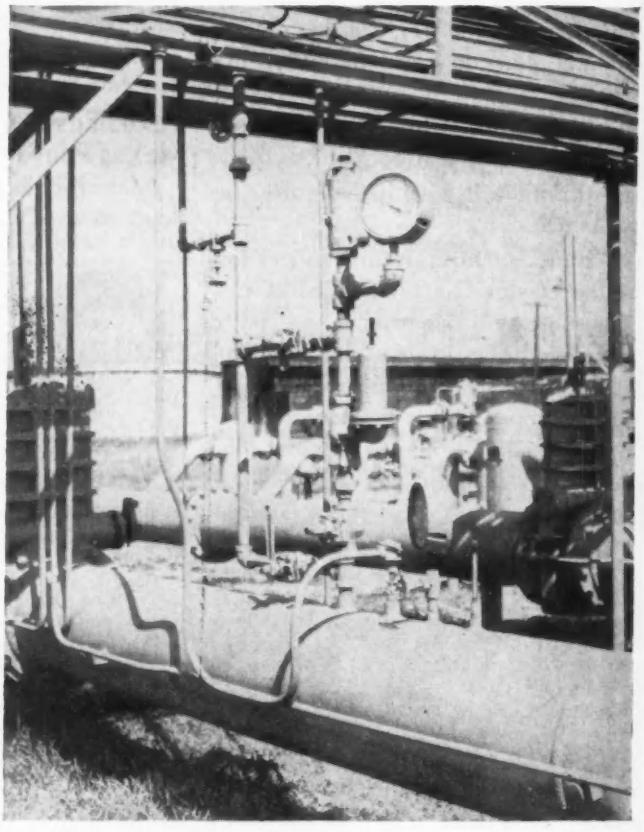
Reheating the entire weld overcomes this problem and makes the entire weld stronger than before.

Performing this operation is especially critical where the welds tie a rigidly fixed header to a rigid vessel as shown in the photo. Structural welds can build up at the tie-in and weld stresses could become additive.

Here is one way to solve the problem. A brick-lined furnace which splits in half can be clamped around the weld and gas burners can bring the temperature to the 1100° to 1500° F. specified by ASA. The bricks inside the furnace hold the temperature at high level long enough for the plastic flow to take place.

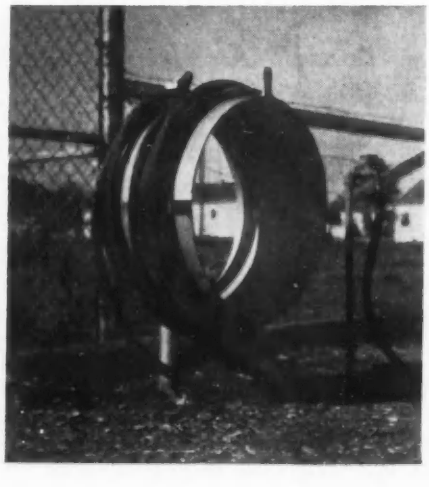
A thermocouple inside the furnace enables the operator to control the temperature inside the furnace.

Auxiliary Air Supply for Controls



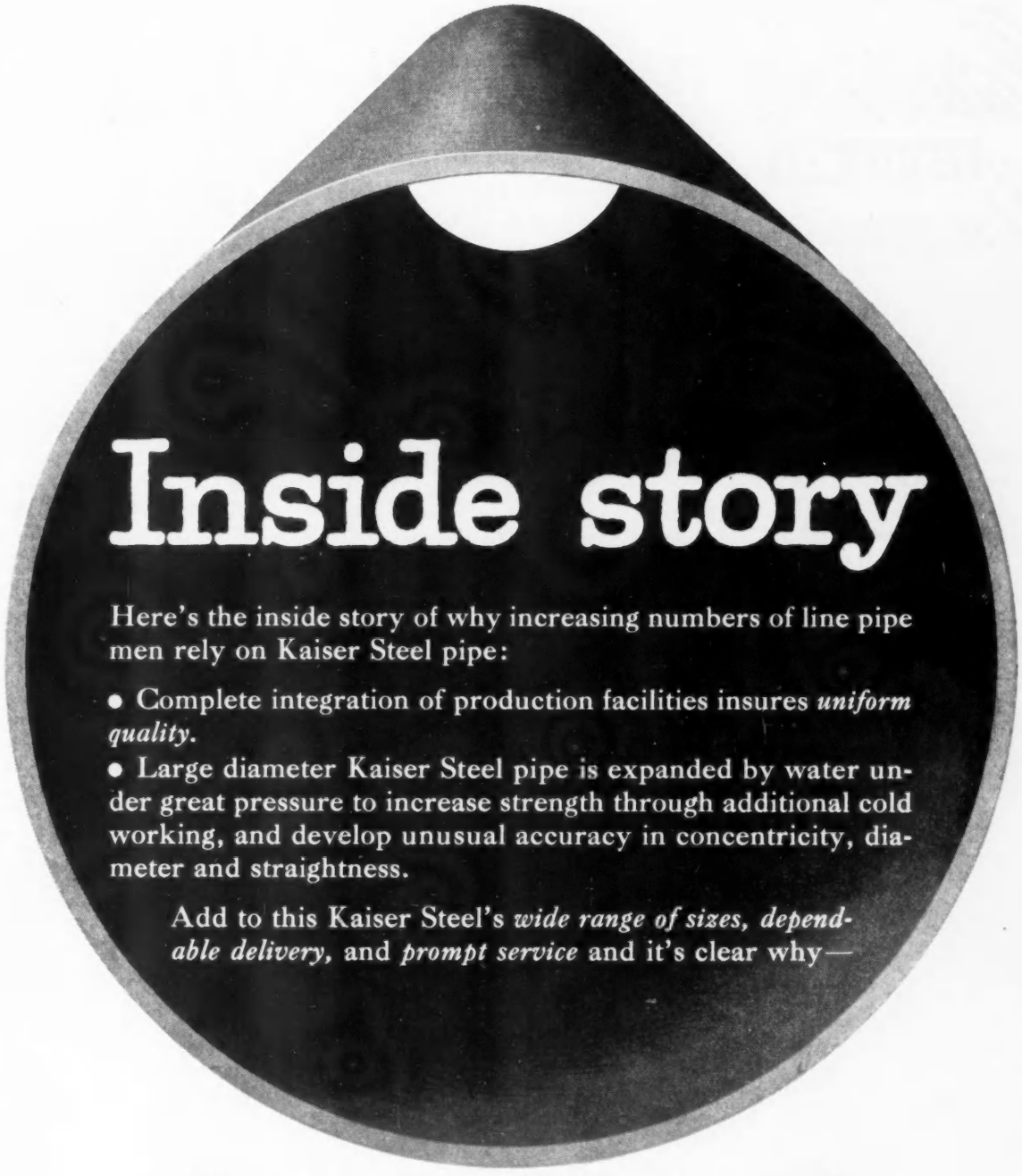
Automatic controls are finding more and more favor in compressor and pump stations. This means that more operations are dependent on automatic control instruments. This makes the sources of instrument air highly important as air failure could cause all instruments to go out of service.

It is good insurance to have an auxiliary pressure source tied into the instrument supply system in case of a compressor breakdown. The attached photograph shows a tie-in to a 100-pound natural gas line which is used as emergency instrument supply. Gas line pressure is dropped slightly through a regulator which is set below the air supply pressure. Thus if the air supply fails, the regulator opens up to supply gas whenever the air pressure drops. A safety pop valve is provided to prevent damage to the instrument in the event the regulator fails or the line pressure controller is not operating properly. The regulator is bypassed also, so that the supply gas may be handled manually if need be.



Storage Reel Made of Pipe

A handy, economical storage reel for hose of various sizes can be made by welding a four-foot piece of 1½-inch pipe across a short length of large diameter pipe. The 1½-inch pipe serves as a stanchion which can be driven in the ground or set in concrete for a permanent installation. The size of the spool piece is governed by size of the hose to be stored on it. Ordinarily, it will vary from



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Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅛" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

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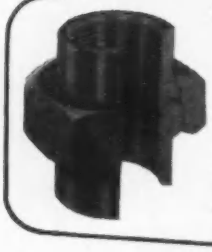

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18 inches to 30 inches.

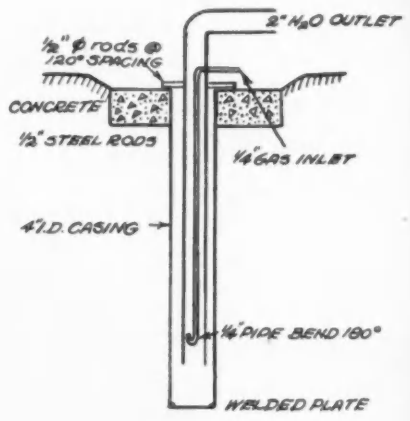
Clips or lugs made of strap steel should be welded to the outside edge of the large pipe to hold the hose on the reel. This assembly should be painted to match nearby piping.

Jet Pump Disposes Of Undrained Water

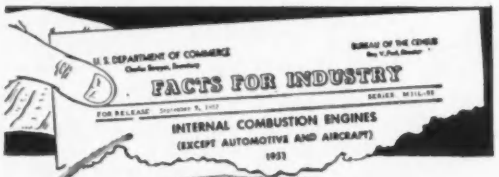
Have you ever been confronted with the problem of having a tank battery location filled with rain water or fluid, and found the outlet drain plugged, or below the water level outside the firewall? This can happen and sometimes does, and here is one answer to a problem of this nature.

During the construction of a tank battery location, level the location to drain to one corner or point within the firewall. This point should then be used for the location of a jet pump such as the one shown in the above diagram.

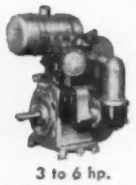
The casing was constructed from four-inch diameter line pipe, 10½-feet in length, with a plate welded to the bottom to check the entrance of ground water up through the opening in the bottom of the casing. The two-

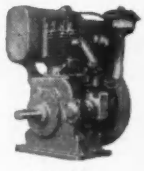


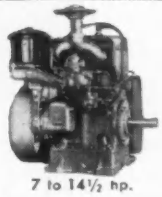
inch tubing was constructed from two-inch standard line pipe and was centrally located within the casing one foot off the bottom of the casing. The ¼-inch supply gas line extends down inside the tubing with a small 180-degree bend at the bottom, about eight inches above the bottom of the tubing. Having the 180 degree bend in the supply gas outlet will allow the operator to exert a greater supply gas pressure on the gas lift system than could be obtained if this outlet was straight downward, rather than upward, as is true in this case.

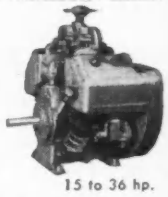


Proof of Top Preference for


3 to 6 hp.


6 to 9 hp.


7 to 14½ hp.


15 to 36 hp.

WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

Based on data contained in a "Facts for Industry" report released on Sept. 5, 1952 by the U. S. Bureau of the Census, an aggregate average of 50.61% of all carburetor type internal combustion engines produced during 1950-'51 within an 11 to 175 cu. in. displ. range (approx. 3 to 40 hp.) were WISCONSIN HEAVY-DUTY AIR-COOLED ENGINES (exclusive of aircraft, automotive, outboard marine and "captive" engines built by various manufacturers for use on their own equipment).

Here is positive proof of top preference for Wisconsin Engines both by original equipment manufacturers and users of power-operated equipment. Proof of constantly growing recognition of the special adaptability of these fine engines to fit both the machine and the job. Proof of heavy-duty dependability and trouble-free air-cooling under weather and climatic extremes.

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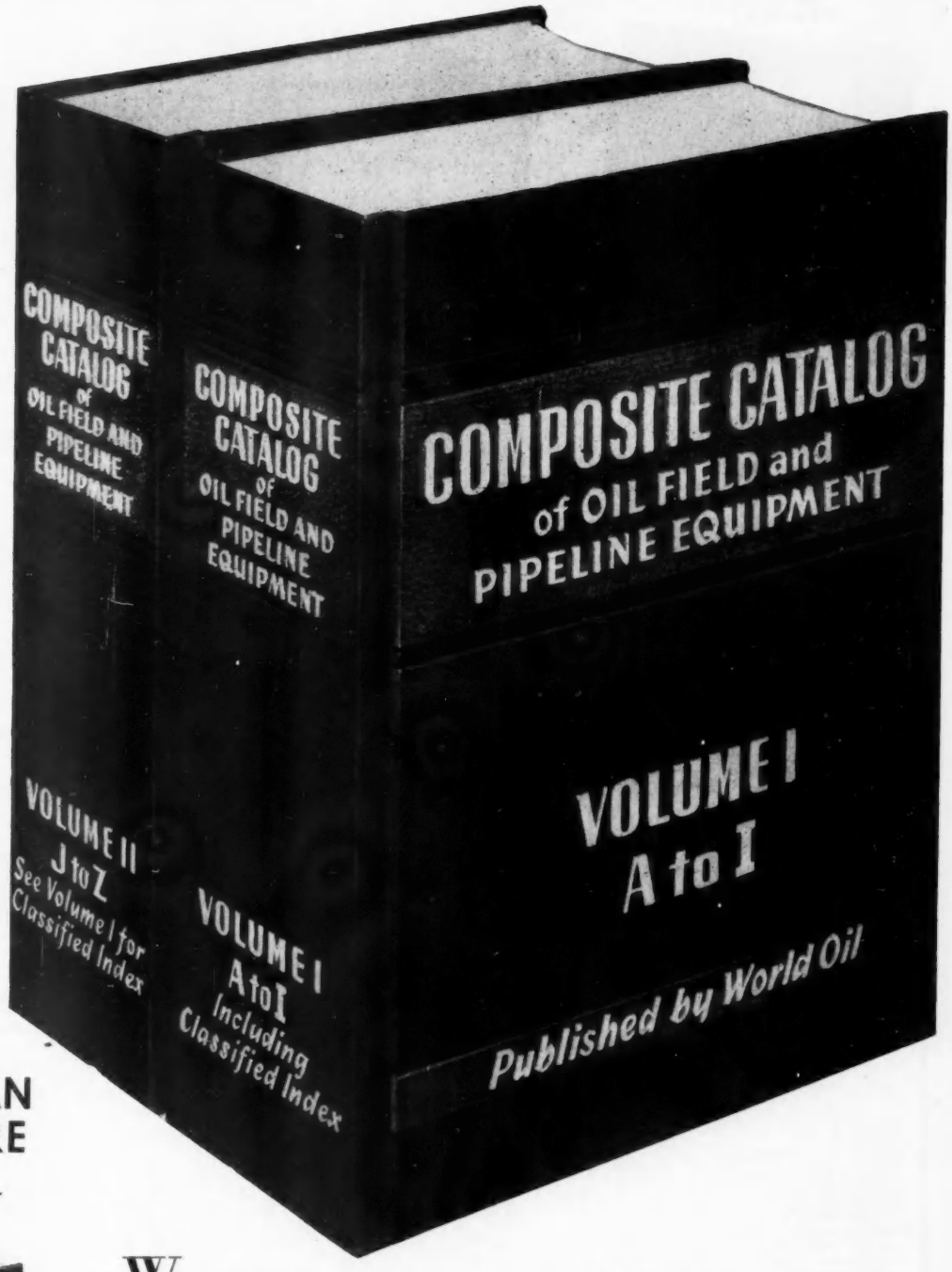
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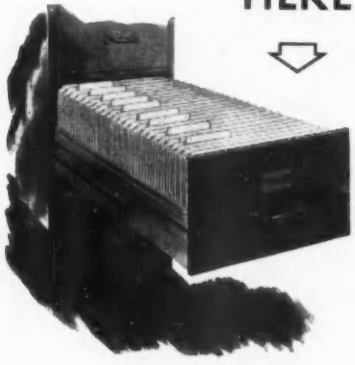

WHATEVER you plan to buy in the way of oil field or pipe line equipment or services, you're certain to find cataloged in the Composite Catalog. More than 500 manufacturers have filed data on over 3,000 products in the current 1953 edition.

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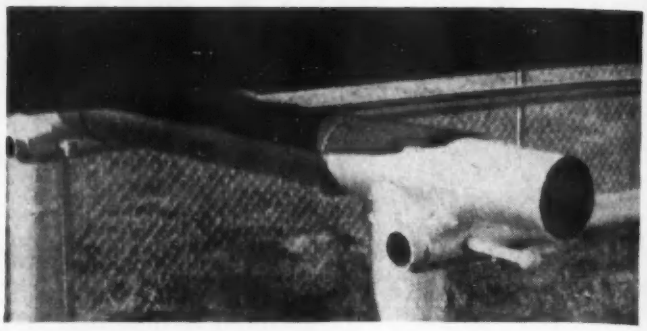
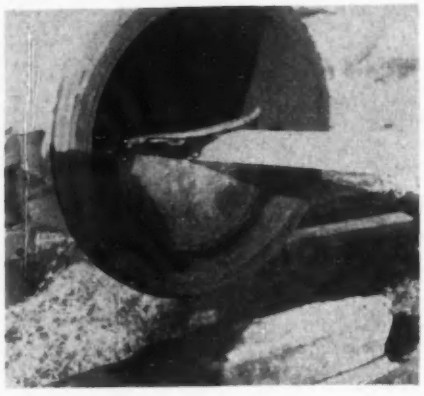


The heavy asphalt rock shield ordinarily used in pipe line construction for protecting pipe coating against the impact of rocks and boulders during backfill, can be applied as a pad on a pipe rack to protect the insulation of pipe stored on the rack.

To use it, cut a piece of the shield to proper size and bind it to the runners with heavy galvanized wire. Be sure to tighten the wire sufficiently so it bites down into the asphalt material of the shield.

Thus, as shown in the accompanying illustration, insulated pipe can be rolled onto the rack with no damage to insulation since the shield is more ductile than the insulation.

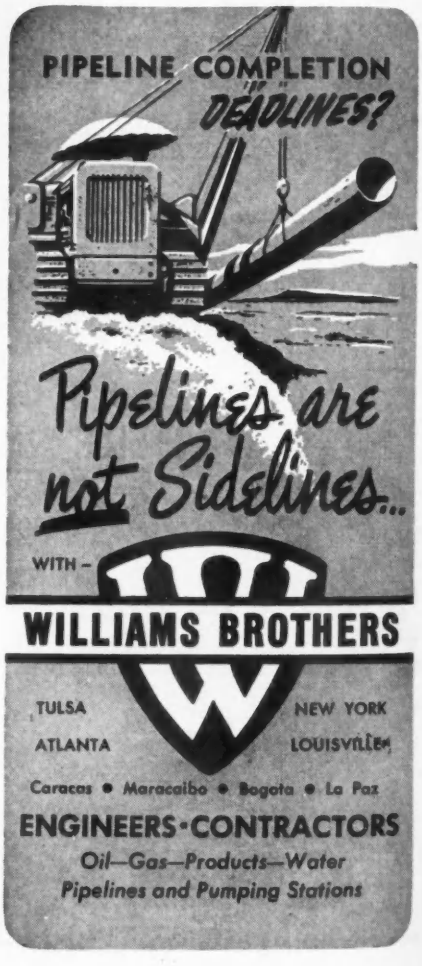
Scraper Tanks Are Easy to Clean

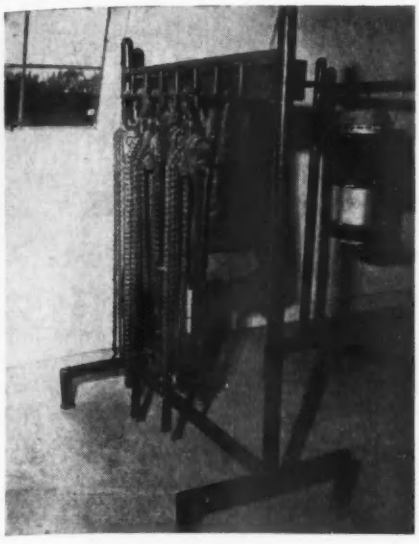


Bend the lid of a five gallon can and nail it to a 2 x 2 board to make an excellent scraper trap cleaner. On large oil or natural gas transmission systems it is often necessary to run scrapers from time to time to improve line efficiency.

After the pig has completed its run through the system, the pipe line pig, with all of the foreign material collected by it, is trapped in a scraper trap where it is later removed from the system. The scraper trap then is bled down to atmospheric pressure and the trap cleaned, and the pig removed from inside the system.

Cleaning the scraper trap with tools such as shovels, hoes, etc., was found to be extremely slow and inadequate. By bending the cover from a five-gallon can and attaching it firmly with metal screws to a 2 x 2-inch x 12-foot piece of lumber as shown in the photograph, it is possible to reach from one end of the scraper trap to the other. The curved surface of the cover also enables the operator to obtain a more thorough cleaning job within a relatively short period of time. With the use of a home-made implement of this type, any scraper trap cleaning problem can be considered a thing of the past.





Simple Installation Provides Lab Samples

Quite frequently it is necessary for laboratory analyses to obtain representative samples of distillate from natural gas or distillate wells. To obtain a sample of this nature it is often necessary to construct a combination of bends as shown in the diagram.

These bends to catch samples can be constructed during the time the original field line is laid from the well to the separating type units. Thus the services of the welder, pipe line crew, and other various facilities which are on hand, are utilized. The additional material required is very small and unimportant, but the results of such an installation in obtaining good samples are excellent.

The important point to consider is the depth of the bend, and it should always be held to at least seven-feet below ground-level to obtain good samples.

Potentials Read By Fixed Installations

A permanent installation for reading potential across insulating flange will eliminate excavation and trouble in taking such readings. Ordinarily the pipe would have to be exposed, or some kind of contact bar, equipped with an insulated tip, used to pierce the coating down to the pipe on both sides of the insulated joint. Both of these methods result in injury to the coating regardless of the amount of

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- ☐ Filling tank trucks with water for initial treaters, indirect heaters, radiators, etc.
- ☐ Transferring tanks (leaky tanks, bad oil; for repairs, cleaning, etc.)
- ☐ Transferring salt water
- ☐ Cleaning up oil lease: line breaks, tank leakage
- ☐ Circulating tank bottoms through treaters
- ☐ Circulating bad tanks through treaters
- ☐ Pumping from tank or treater to slush pit
- ☐ Driving chemical feed pump
- ☐ Draining treater for cleaning
- ☐ Domestic service around lease houses
- ☐ Cleaning B.S.&W. from tanks (heavy)
- ☐ Cleaning B.S.&W. from tanks (light)

PIPELINE OPERATIONS AND MAINTENANCE
- ☐ Cleaning up oil lease
- ☐ Pumping out sumps
- ☐ Removing water from pump houses
- ☐ Dewatering for repairs
- ☐ Salvaging oil in event of line break
- ☐ Transferring tanks in case of leaks
- ☐ Gathering systems (lower pressures)

PIPELINE CONSTRUCTION
- ☐ Dewatering
- ☐ Water supply to equipment
- ☐ Washing down equipment
- ☐ Pumping station foundations

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- ☐ Pumping cooling water
- ☐ Pumping out sumps
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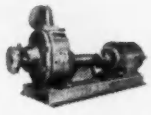
Marlow Self-Priming Centrifugal

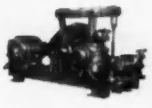


High capacity and high pumping efficiency with automatic priming. Trouble-free service on suction lifts with no vapor-lock. Gasoline engine, electric motor and belt driven models. Close and long coupled models, sizes 1½ to 10", capacities 15 to 3500 GPM.

Marlow Horizontal, End Suction, Centrifugal

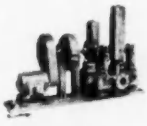
Dependable pumping of liquids on flooded suction installations. Close and long coupled models. Gasoline engine, electric motor or belt driven models. Sizes 1" to 8", capacities 10 to 2,000 GPM. Pressures to 200 PSI. Many new design features assure efficient performance.

Marlow Diaphragm Pump



A powerful lift and force pump for handling sludge and waste material at total heads to 40 feet. Gasoline engine, electric motor or belt driven models. Sizes 2", 3" and 4". Capacities to 150 GPM. A pump designed for the hard jobs.

Marlow Plunger Pump



A heavy duty pump for handling thick sludge and waste fluids. Constructed with 7, 9 or 11 inch diameter plungers. Capacities to 500 GPM. Pipe Connections 4" to 8". Built with 1, 2, 3 or 4 plungers. Special high pressure models available.

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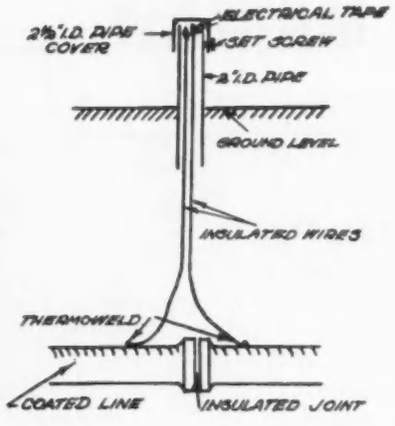

caution used. As a result, additional holidays occur in the coating when these methods are pursued. An improved method is advisable.

A very simple method may be utilized to eliminate objectional results in this situation, and will also achieve more accurate results in the reading. An insulated lead wire, thermowelded to the pipe or flange on both sides of the insulated joint, is brought to the ground surface. These wires can be coiled and placed inside a protector as shown in the illustrated diagram.

Where the lead wires are welded to the pipe line, the area should be thoroughly cleaned, primed with some suitable type of commercial priming solution, and a hot application of a coal tar enamel should be applied over the entire section where the lead wires were welded to the pipe line. If a color scheme is used for the insulated lead wires, each wire can be readily distinguished as either connected to the upstream or downstream side of the insulated joint.

The use of this method has many advantages as previously discussed, and on future surveys it is a relatively simple matter to check the effectiveness of the insulated joint through these insulated wires at the surface of the ground.

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World Oil Index

TOUGH ENOUGH for the Job

Your WATE-KOTED pipe will probably never be subjected to this particular type of abuse, but loading, unloading and laying can exert a lot of strain on it. That's why all Rosson-Richards WATE-KOTED pipe is uniformly reinforced with Key Mesh Wire or Single Strand Wire to provide an adherent material almost as strong as the pipe itself.

WATE-KOTE is not only the heaviest weighting material of its type yet developed, but is tough enough to take a lot of punishment during laying operations. WATE-KOTE was developed by Rosson-Richards to lick the tough job of laying pipe through open water, rivers or marshy ground. The high strength and high-density of WATE-KOTE make it the ideal weighting material to keep pipe on bottom.

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World Supply and Demand

Increases 4.8 Percent

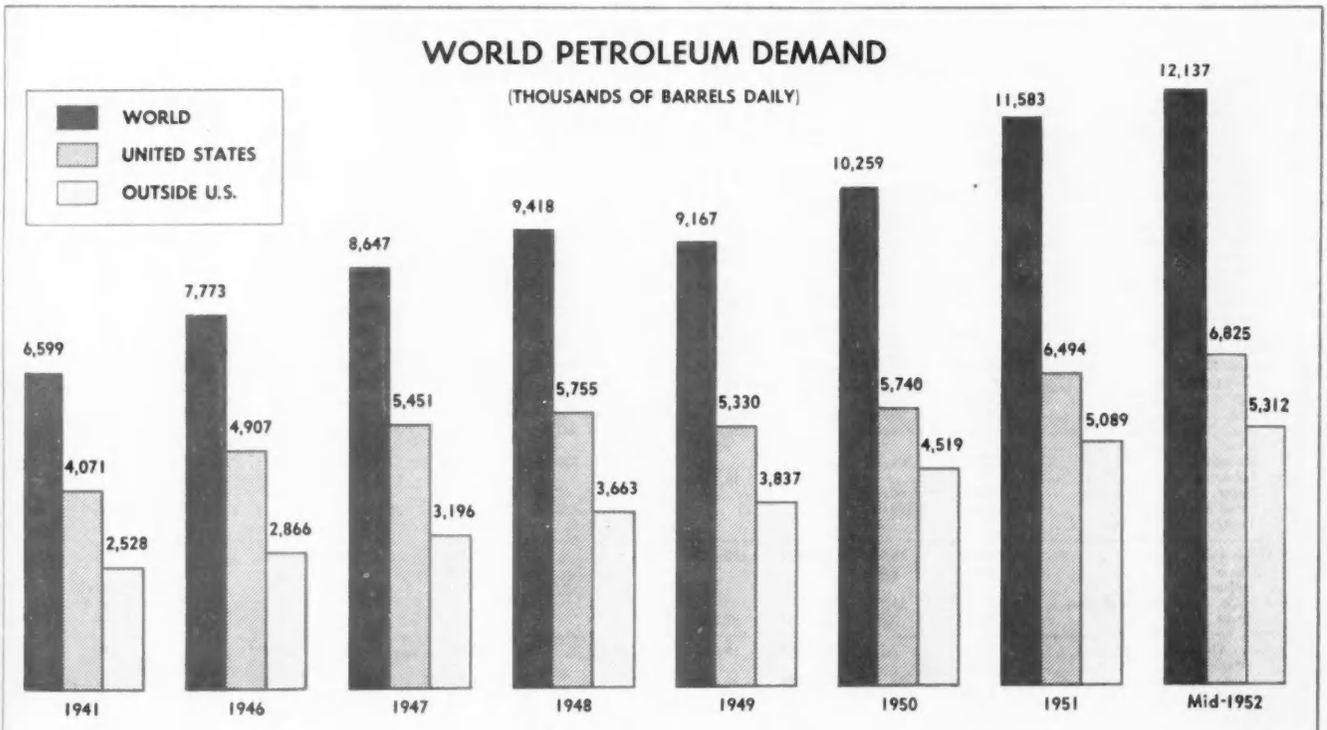
WORLD OIL DEMAND increased by mid-1952 to a daily average of 12,137,665 barrels, up 554,932 barrels from the daily average reported for all of 1951, or a rise of 4.8 percent. Demand for world oil in mid-1951 was 12 percent more than the daily average reported for the entire year 1950. The greatest percentage climb yet reported occurred with 1950's 14 percent upsurge from 1949.

While Western European countries again marked up the greatest volume increase in oil products demand outside the U. S.—261,227 barrels—China, Formosa, India, Burma, Pakistan and Japan combined to report the greatest demand percentage increase for the world—43.8 percent.

All Western European nations contributed to rising demands in shoving their combined total from 1,139,806 barrels for all of 1951 to 1,401,033 barrels at mid-1952—a percentage hike of 22.9. The United Kingdom crude runs to stills averaged 436,333 barrels a day during June, 1952; France averaged 427,133 barrels. Third among Western European crude processors was the 187,100 barrels attributed to Italy and Trieste, an increase of 37,755 barrels from the daily average for all of 1951.

This trend of marked increases for Western Europe was credited to continuing plentiful supply, renewed efforts designed to combat a threat of possible war and accelerated efforts to expand "home" refining.

In North America only Mexico was a net exporter of crude. With a daily average production increase of 4787 barrels at mid-1952 from the daily average for all of 1951 of 211,813 barrels, or 2.3 percent, Mexico's exports in June, 1952, slipped to a daily average of 17,066 barrels from a daily average of 46,795 barrels for the pre-



YEAR	U.S. Domestic	Outside U.S.	World Total
1938	3,115,000	2,127,000	5,272,000
1939	3,373,000	2,162,000	5,535,000
1940	3,625,000	1,838,000	5,463,000
1941	4,071,000	2,528,000	6,599,000
1946	4,907,000	2,866,000	7,733,000
1947	5,451,000	3,196,000	8,647,000
1948	5,755,000	3,663,000	9,418,000
1949	5,330,189	3,836,455	9,166,644
1950	5,739,362	4,519,156	10,258,518
1951	6,494,243	5,088,490	11,582,733
Mid-1952	6,825,399	5,312,266	12,137,665

vious year. That was a decline in daily exports of 63.5 percent.

These figures indicate a major growth in domestic consumption and a rising stock tank average.

U. S. daily average production for June, 1952, of 6,197,233 barrels was 47,853 barrels above the daily average reported for all of the previous year, or .8 percent. At mid-year, U. S. demand was 628,166 barrels a day more than domestic supply. Imports averaging 581,133 barrels a day made up the difference and enabled the U. S. to export an average 79,600 barrels daily.

Argentina, Brazil, Netherlands Antilles, Trinidad and Uruguay production could not keep pace with domestic requirements at mid-1952. Neither Netherlands Antilles nor Uruguay had reportable crude yields, hence their combined daily average imports in June, 1952, of 793,733 barrels. All five of these countries had combined exports reaching to 917,266 barrels daily in mid-1952.

Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela produced more crude than they consumed.

The Middle East boasted a mid-1952 daily average production of 2,254,333 barrels, up 14.1 percent from the daily average for all of 1951. Of that yield, daily average export in June, 1952, was 1,908,633 barrels, or 84.67 percent. Exports from this oil-surplus region are high because of spiraling production and low domestic requirements.

World Supply and Demand, Crude Petroleum, by Countries

(Based on U. S. Bureau of Mines Monthly Report, "World Petroleum Statistics," covering Year 1951 and June, 1952)

ACTUAL BARRELS DAILY

COUNTRY	PRODUCTION		IMPORTS		EXPORTS		CRUDE RUNS TO STILLS		OTHER DEMAND AND LOSSES		STOCK CHANGE	
	Bbls. Daily Year 1951	Bbls. Daily June, 1952	Bbls. Daily Year, 1951	Bbls. Daily June, 1952	Bbls. Daily Year, 1951	Bbls. Daily June, 1952	Bbls. Daily Year, 1951	Bbls. Daily June, 1952	Bbls. Daily Year, 1951	Bbls. Daily June, 1952	Bbls. Daily Year, 1951	Bbls. Daily June, 1952
North America	**6,491,980**	**6,594,133**	**724,198**	**812,833**	**126,430**	**98,666**	**7,004,686**	**7,398,332**	**54,074**	**44,333**	**+30,989**	**−134,367**
Canada	130,433	179,967	227,780	220,400	1,268	2,000	348,599	383,633	986	1,000	+ 7,359	+ 13,733
Cuba	354	333	5,808	11,300	.....	.....	6,283	8,900	8	.....	− 129	+ 2,733
Mexico	211,813	216,600	.....	.....	46,795	17,066	155,561	180,400	5,754	8,333	+ 3,704	+ 10,800
Total N. America, excl. U.S.	342,600	396,900	233,588	231,700	48,063	19,066	510,443	572,933	6,748	9,333	+10,934	+ 27,266
United States	6,149,380	6,197,233	490,610	581,133	78,367	79,600	6,494,243	6,825,399	47,326	35,000	+20,055	−161,633
South America and Caribbean	**1,991,122**	**2,117,766**	**971,536**	**917,266**	**1,479,525**	**1,490,367**	**1,472,312**	**1,461,033**	**11,994**	**53,867**	**− 874**	**+ 29,767**
Argentina	67,027	69,833	57,260	68,833	.....	.....	126,849	124,667	1,233	1,000	− 3,795	+ 13,000
Bolivia	1,432	1,500	.....	.....	230	167	1,159	1,667	.....	.....	+ 44	− 333
Brazil	1,893	1,867	1,685	2,000	.....	.....	3,507	3,667	71	33	.....	+ 167
Chile	2,079	2,233	.....	.....	2,378	.....	.....	.....	33	33	− 332	+ 2,200
Colombia	105,331	106,200	.....	.....	78,296	63,800	25,142	31,133	2,266	2,500	− 373	+ 8,767
Ecuador	7,419	7,667	.....	.....	3,433	.....	4,667	4,633	21	67	− 701	+ 2,967
Netherlands Antilles	.....	.....	851,710	784,066	5,000	.....	847,672	792,300	.....	.....	− 961	− 8,233
Peru	44,136	46,367	.....	.....	7,186	5,633	36,910	36,400	244	100	− 202	+ 4,233
Trinidad	57,104	57,400	43,874	52,700	5,011	10,067	95,555	94,833	192	134	+ 219	+ 5,066
Uruguay	.....	.....	17,307	9,667	.....	.....	17,307	11,667	.....	.....	.....	− 2,000
Venezuela	1,704,701	1,824,699	.....	.....	1,377,991	1,410,700	313,544	360,066	7,934	50,000	+ 5,227	+ 3,933
Total Western Hemisphere	**8,483,102**	**8,711,899**	**1,696,034**	**1,730,099**	**1,605,955**	**1,589,033**	**8,476,998**	**8,859,365**	**66,068**	**98,200**	**+30,115**	**−104,600**
Western Europe	**46,937**	**57,333**	**1,108,859**	**1,487,966**	**332**	.....	**1,139,806**	**1,401,033**	**1,288**	**1,433**	**+14,370**	**+142,833**
Belgium	.....	.....	19,729	62,000	181	.....	17,507	57,134	.....	.....	+ 2,041	+ 4,867
Denmark	.....	.....	534	1,300	.....	.....	501	800	.....	.....	+ 33	+ 500
France	5,578	6,899	369,636	423,433	151	.....	372,892	427,133	329	333	+ 1,841	+ 2,867
Western Germany	26,482	34,467	69,803	60,500	.....	.....	94,397	103,533	247	333	+ 1,641	− 8,900
Italy and Trieste	373	1,167	147,983	213,133	.....	.....	149,345	187,100	219	267	− 1,208	+ 26,934
Netherlands	13,589	13,567	123,929	170,833	.....	.....	138,043	147,900	164	167	− 690	+ 36,333
Norway	.....	.....	756	.....	.....	.....	752	1,100	.....	.....	+ 5	− 1,100
Portugal	.....	.....	8,041	14,633	.....	.....	7,337	10,000	.....	.....	+ 704	+ 46,633
Spain	.....	.....	7,167	20,167	.....	.....	7,238	8,333	.....	.....	− 71	+ 11,833
Sweden	.....	.....	21,178	24,800	.....	.....	20,548	21,667	.....	.....	+ 630	+ 3,133
United Kingdom	915	1,233	340,103	497,167	.....	.....	331,246	436,333	329	333	+ 9,444	+ 61,733
Middle East	**1,975,442**	**2,254,333**	**178,568**	**188,000**	**1,430,879**	**1,908,633**	**719,943**	**519,467**	**9,230**	**8,400**	**− 6,041**	**+ 5,833**
Bahrain Island	30,120	30,033	149,882	166,967	.....	.....	180,213	194,933	386	400	− 597	+ 1,666
Egypt	44,688	44,700	2,013	.....	.....	.....	46,112	43,400	329	333	+ 260	+ 967
Iran	349,588	30,000	.....	.....	73,424	.....	273,972	29,667	2,466	333	− 274	.....
Iraq	178,416	419,900	.....	.....	161,854	399,567	10,910	12,334	3,342	5,667	+ 2,309	+ 2,333
Israel	.....	.....	15,427	9,667	.....	.....	14,682	10,000	.....	.....	+ 745	− 333
Kuwait	561,396	764,067	.....	.....	537,903	720,466	23,389	27,433	452	633	− 348	+ 15,533
Lebanon	.....	.....	11,246	11,366	.....	.....	11,247	11,367	.....	.....	.....	.....
Qatar	49,340	66,300	.....	.....	49,293	66,167	.....	.....	247	134	.....	.....
Saudi Arabia	761,541	899,033	.....	.....	608,605	722,433	159,199	190,133	1,874	800	− 8,136	− 14,333
Turkey	353	300	.....	.....	.....	.....	219	200	134	100	.....	.....
Other Asia	**19,600**	**18,933**	**54,978**	**105,400**	.....	.....	**72,342**	**104,033**	**460**	**300**	**+ 1,775**	**+ 20,000**
China	2,000	2,000	.....	.....	.....	.....	1,918	1,933	82	67	.....	.....
Formosa	60	33	4,937	7,533	.....	.....	5,425	4,733	.....	.....	− 427	+ 2,833
India, Burma and Pakistan	11,137	11,100	.....	.....	.....	.....	10,783	11,000	247	100	+ 107	.....
Japan	6,403	5,800	50,041	97,867	.....	.....	54,216	86,367	131	133	+ 2,095	+ 17,167
Other Africa	**1,671**	**2,133**	**17,685**	**19,000**	**134**	.....	**19,882**	**18,034**	**30**	**33**	**− 690**	**+ 3,067**
Algeria	134	.....	.....	.....	134	.....	.....	.....	.....	.....	.....	.....
Canary Islands	.....	.....	17,636	19,000	.....	.....	18,345	15,834	.....	.....	− 709	+ 3,167
French Morocco	1,537	2,133	49	.....	.....	.....	1,537	2,200	30	33	+ 19	− 100
Oceania	**259,462**	**281,267**	**18,030**	**14,467**	**39,613**	**42,666**	**231,024**	**255,733**	**3,000**	**2,834**	**+ 3,855**	**− 5,500**
Australia	5	.....	18,030	14,467	.....	.....	18,353	19,966	.....	.....	− 317	− 5,500
British Borneo	102,734	104,300	.....	.....								
Indonesia	151,926	176,967	.....	.....	39,613	42,666	212,671	235,767	2,986	2,834	+ 4,172	.....
New Guinea	4,783	.....	.....	.....								
New Zealand	14	.....	.....	.....	.....	.....	.....	.....	14	.....	.....	.....
Total Above Countries	**2,303,112**	**2,613,999**	**1,378,120**	**1,814,833**	**1,470,958**	**1,951,299**	**2,182,997**	**2,298,300**	**14,008**	**13,000**	**+13,269**	**+166,233**
U.S.S.R. and Eastern Europe	**947,943**	**1,006,667**	**2,192**	**2,000**	.....	.....	**922,738**	**980,000**	**27,397**	**28,667**	.....	.....
U.S.S.R.	799,998	860,000	.....	.....	.....	.....	775,341	833,333	24,657	26,667	.....	.....
Other Eastern Europe	147,945	146,667	2,192	2,000	.....	.....	147,397	146,667	2,740	2,000	.....	.....
Total Eastern Hemisphere	**3,251,055**	**3,620,666**	**1,380,312**	**1,816,833**	**1,470,958**	**1,951,299**	**3,105,735**	**3,278,300**	**41,405**	**41,667**	**+13,269**	**+166,233**
Total World Outside U.S.	**5,584,777**	**6,135,332**	**2,585,736**	**2,965,799**	**2,998,546**	**3,460,732**	**5,088,490**	**5,312,266**	**60,147**	**104,867**	**+23,329**	**+223,266**
WORLD TOTAL	**11,734,157**	**12,332,565**	**3,076,346**	**3,546,932**	**3,076,913**	**3,540,332**	**11,582,733**	**12,137,665**	**107,473**	**139,867**	**+43,384**	**+ 61,633**

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World Crude Reserves

Increase 13.5 Billion Barrels

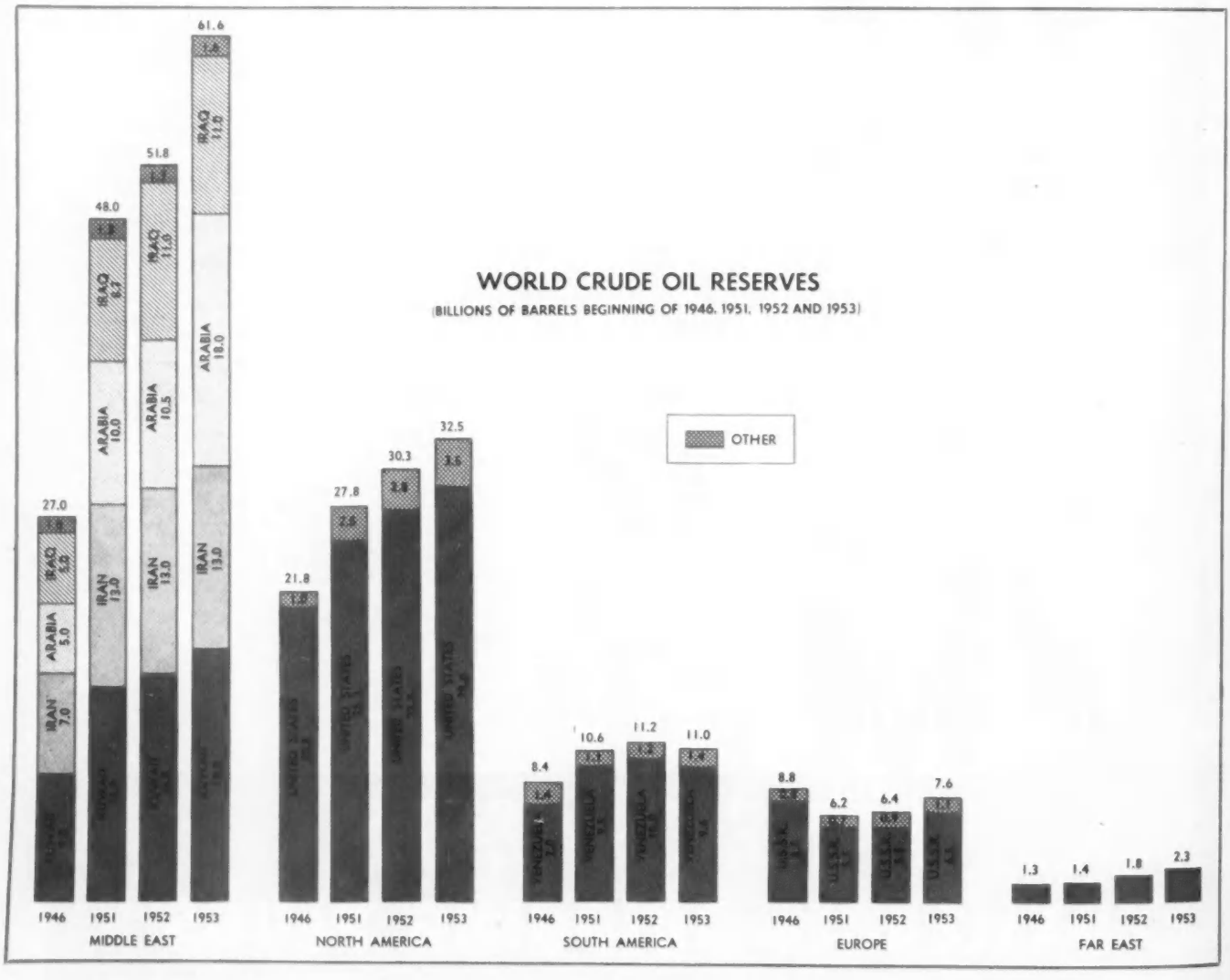
WORLDWIDE PROVED crude reserves at the beginning of 1953 were put at 115,177,701,000 barrels by WORLD OIL. This is a gain from the same period the year before of 13,540,720,000 barrels, or 13.3 percent. Thus, the increased reserves moved upward at a faster rate than the 1952 figure, which was 7.8 percent greater than the previous year. This quickening pace stemmed from the paralleling increased tempo of exploration activity of 1952. The greatest gains were made in the Middle East, North America and Europe, in that order.

Each recorded a gain of more than 1¼ billion barrels. The Middle East was credited with a gain of 9,745,000,000 barrels from the reserve figure of January 1, 1952—an increase of 18.8 percent—to reach a total estimated proved reserves of 61,570 million barrels. With an annual production of 762,207,000 barrels reached during 1952, current Middle East reserves are equivalent to 80.8 years of output and give the region a 53.46 percent share in total world reserves.

Middle East figures are estimates of actually proved reserves, and make no allowance for any indicated reserves which would be a great deal larger. Even so, these estimates of Middle East proved reserves are considered conservative by many observers.

Largest reserves credited to the Middle East are those of Saudi Arabia and Kuwait (18 billion barrels each), Iran (13 billion barrels) and Iraq (11 billion barrels).

Iraq reserves were boosted from 10½ billion barrels at the beginning of 1952, due principally to developments during the year in the Basrah area. Reserves in Kirkuk field alone



were estimated at 8.5 billion barrels. Kuwait reserves climbed 2 billion barrels from January 1, 1952, to the first of 1953 on the basis of the Magwa extension of the field. Some sources have placed reserves for Kuwait at more than 20 billion barrels, 2 billion barrels in excess of the WORLD OIL figure.

Qatar reserves improved to the extent of 250 million barrels—from the year-ago figure of 1 billion barrels—on the basis of development work; however, the south extension to the Dukhan field with the Juh well was not as promising as expected.

While estimates on Middle East reserves vary, WORLD OIL has used conservative figures to aid in a more certain evaluation of the vast crude producing area.

At the close of 1952, the U. S. had a crude reserve of 29,020,601,000 barrels, a net gain over the previous year of 1,552,570,000 barrels, and 25.2 percent of the world's total estimated reserves. Last year the U. S. yielded 50.86 percent of the total world production, or 2,262,269,000 barrels, which when added to the net gain in reserves for the year means a total of 3,814,839,000 barrels of new oil was found in this country during 1952. That discovery figure is 13.6 percent less than the amount of new oil proved up in the U. S. in 1951.

Based on an annual production of 1952's 2,262,269,000 barrels, up 2.2 percent from the previous year, the U. S. had a ratio of reserves to annual production of 12.8 years. That compares favorably with a ratio of 13.5 years for the entire North American continent.

Estimated proved crude reserves for South America reflected a decline of 2 percent at the close of 1952 as compared with the previous year. The total moved downward from 11,220 million barrels to 10,995 million barrels. Venezuela's decrease more than offset increases in Brazil, Chile, Colombia, Ecuador, and Peru. Unchanged from the previous year were Argentina, Bolivia and Trinidad.

Venezuela's decrease of 400 million barrels still left that nation holding 8.33 percent of the world's crude reserves as compared with 1.22 percent for the remainder of South America. Based on 1952's annual production of 656,045,000 barrels, Venezuela's reserves equal 14.6 years of output. The combined South American reserves were 14.4 times 1952's annual production of 762,310,000 barrels—17.14 percent of the total world yield during the year.

European reserves as of January 1, 1953, totaled 7,635,000,000 barrels, up 1,259,200,000 barrels or 19.7 percent from the previous year. Credited with 85 percent of Europe's total proven reserves, Russia's reserve position improved by 1 billion barrels at the close of last year from 1951, through upward revision of estimates. In 1952 the USSR produced 311,400,000 barrels, or 7.01 percent of total world output. At that producing rate, Russia's currently estimated reserves are 20.9 times annual production. Europe's combined reserves are 19.7 times the 1952 production rate of 386,810,000 barrels annually.

Various sources have pegged Russian reserves from 5.5 billion barrels to 31 billion barrels. A variety of guesses are available, but there is an absence of satisfactory data upon which to base a careful analysis of the nation's reserves.

WORLD OIL evaluates reserves for foreign crude producing countries on the basis used in the U. S. Under this approach, only reserves are counted which have been proved by drilling and which may be recovered by further drilling. Russia's possibilities can only be guessed, and there is no data indicating the country has developed potentialities to the extent indicated by some of the high estimates offered by some sources.

Estimated World Crude Oil Reserves, by Countries

(THOUSANDS OF BARRELS)

CONTINENT and COUNTRY	*ESTIMATED RESERVES		*ANNUAL PRODUCTION		Ratio of Reserves to Annual Prod. (Year's Supply)
	Thousand Barrels Jan. 1, 1953	Percent of World	Thousand Bbls. in 1952	Percent of World	
North America	**32,473,101**	**28.19**	**2,402,761**	**54.01**	**13.5**
Alaska	500	.....	.....	.....	.....
Canada	1,750,000	1.52	61,578	1.38	28.4
Cuba	2,000	.....	120	0.00	16.7
*Mexico	1,700,000	1.47	78,794	1.77	21.6
*United States	29,020,601	25.20	2,262,269	50.86	12.8
South America	**10,995,000**	**9.55**	**762,310**	**17.14**	**14.4**
Argentina	300,000	0.26	24,337	0.55	12.3
Bolivia	10,000	0.01	546	0.01	18.3
Brazil	40,000	0.03	740	0.02	54.1
Chile	35,000	0.03	821	0.02	42.7
Colombia	475,000	0.42	39,297	0.88	12.1
Ecuador	35,000	0.03	2,802	0.06	12.5
Peru	250,000	0.22	16,857	0.38	14.8
Trinidad	250,000	0.22	20,865	0.47	12.0
Venezuela	9,600,000	8.33	656,045	14.75	14.6
Europe	**7,635,000**	**6.63**	**386,810**	**8.70**	**19.7**
Albania	20,000	0.02	1,010	0.02	19.8
Austria	200,000	0.17	17,385	0.40	11.5
Czechoslovakia	10,000	0.01	842	0.02	11.9
France	50,000	0.05	2,456	0.05	20.4
Germany, West	300,000	0.26	12,200	0.27	24.6
Great Britain	5,000	.....	413	0.01	12.1
Hungary	40,000	0.03	3,367	0.08	11.9
Italy	5,000	.....	448	0.01	11.2
Netherlands	75,000	0.07	5,062	0.11	14.8
Poland	20,000	0.02	1,502	0.04	13.3
Roumania	400,000	0.35	29,720	0.66	13.5
U.S.S.R. (Russia)	6,500,000	5.64	311,400	7.01	20.9
Yugoslavia	10,000	0.01	1,005	0.02	10.0
Africa	**214,000**	**0.18**	**17,531**	**0.39**	**12.2**
Algeria	4,000	.....	293	0.00	13.7
Egypt	200,000	0.17	16,478	0.38	12.1
Morocco, French	10,000	0.01	760	0.01	13.2
Asia, Total	**63,860,500**	**55.45**	**878,584**	**19.76**	**72.7**
Asia, Middle East	**61,570,000**	**53.46**	**762,207**	**17.14**	**80.8**
Bahrain	300,000	0.26	11,005	0.25	27.3
Iran (Persia)	13,000,000	11.29	10,700	0.24	1,215.0
Iraq	11,000,000	9.55	138,932	3.12	79.2
Kuwait	18,000,000	15.63	274,100	6.17	65.7
Qatar	1,250,000	1.08	24,962	0.56	50.1
Saudi Arabia	18,000,000	15.63	302,395	6.80	59.5
Turkey	20,000	0.02	113	0.00	177.0
Asia, Far East	**2,290,500**	**1.99**	**116,377**	**2.62**	**19.7**
Borneo, British (Sarawak and Brunei)	550,000	0.47	38,520	0.86	14.3
Burma	45,000	0.04	732	0.02	61.5
India	28,000	0.03	2,050	0.05	13.7
Pakistan	22,000	0.02	1,647	0.04	13.4
China	15,000	0.01	732	0.02	20.5
Formosa	500	.....	15	0.00	33.3
Japan	30,000	0.03	2,143	0.05	14.0
Indonesia	1,400,000	1.21	61,726	1.39	22.7
New Guinea, Western	100,000	0.09	1,812	0.04	55.2
Sakhalin	100,000	0.09	7,000	0.15	14.3
Australia-New Zealand	**100**	.....	**7**	**0.00**	**14.3**
Total, World	**115,177,701**	**100.00**	**4,448,003**	**100.00**	**25.9**

* Crude oil only; not including natural gas liquids.

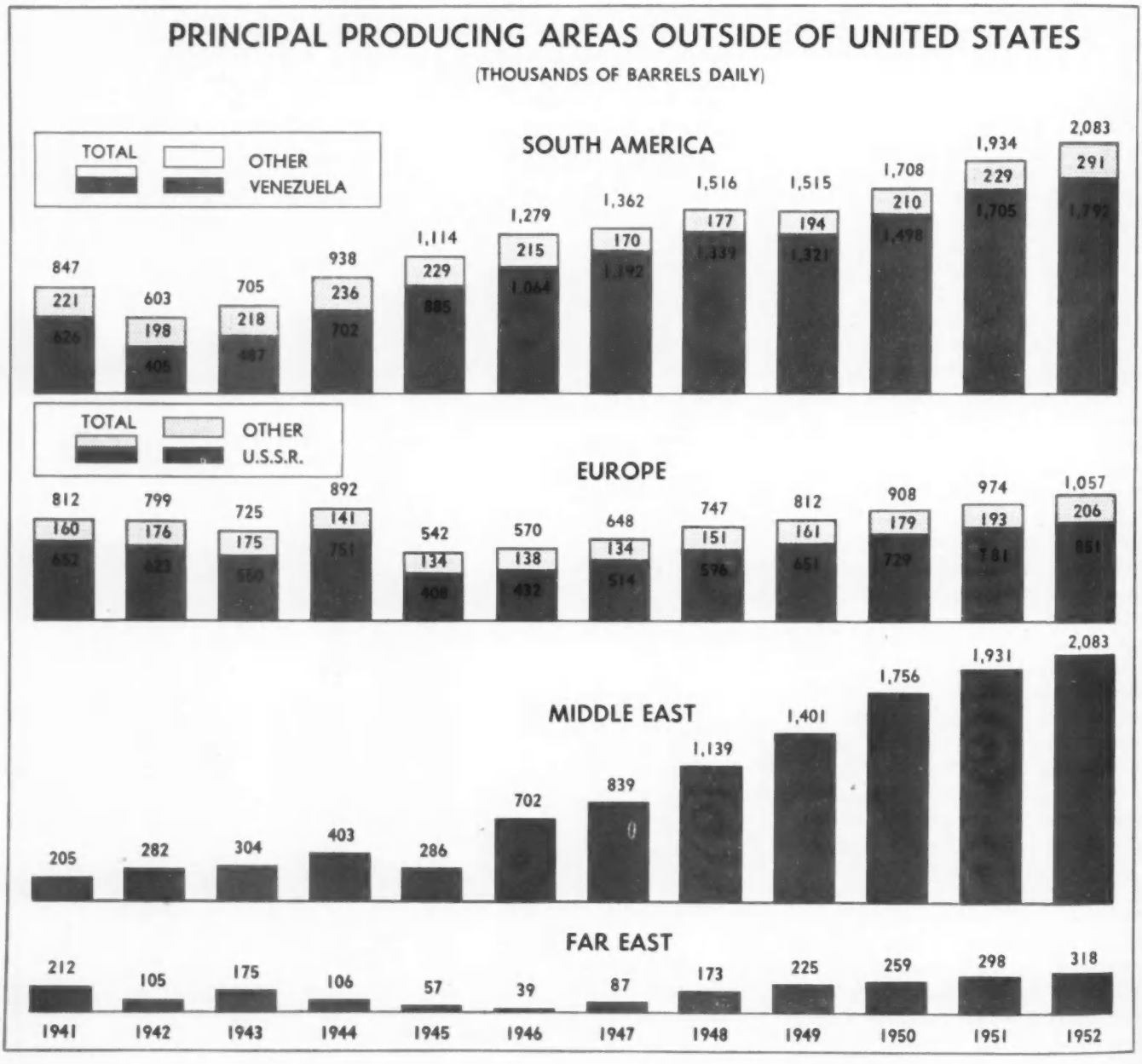
World Crude Production

Continues Steady Climb

THE YEAR 1952 fulfilled expectations that no leveling off in world crude production would occur by marking up an increase in daily average production of 537,912 barrels—a 4.6 percent rise—for a total of 12,239,752 barrels a day. In 1951 daily average production of 11,701,840 barrels amounted to a hike of 12.1 percent from the previous year. A further increase is expected in 1953 of 510,248 barrels a day, or 4.2 percent, to 12,750,000 barrels.

The daily average increase in 1952 resulted in total annual production of 4,479,750,000 barrels, up 196,876,000 barrels from 1951. Based upon the predicted increase in daily average production in 1953 of 4.2 percent, total crude yield for the world is expected to reach approximately 4,653,750,000 barrels.

Daily average production outside the U. S. rose from 5,569,248 barrels in 1951 to 5,971,950 barrels last year —a gain of 402,702 barrels or 7.2 percent—to reach a total yield for the year of 2,185,734,000 barrels. In comparison, the U. S. accounted for a 2.2 percent increase in daily average



yield of 135,210 barrels to 6,267,802.

In 1953, for the first time since 1902, crude production outside the U. S. probably will exceed U. S. output. It is expected to average about 6,421,200 barrels per day, an increase of 449,250 daily or 7.0 percent, while the forecast for the U. S. is 6,328,800 barrels, a gain of approximately 61,000 daily or 1 percent.

The world's producers had little difficulty in replacing the continuing absence of Iranian crude; much less difficulty, in fact, than the nation itself experienced in subsisting without revenues from its oil. At the close of 1952, the Iranian controversy had moved no nearer a solution than it had at the same time the previous year.

It was the Middle Eastern oil-producing countries which continued easing the worried minds of those who were still doubtful whether loss of Iran crude could be made up without upsetting the world trade applecart somewhere. Last year saw the Middle East hike its total daily production to 2,082,532 barrels, up 8.16 percent, or 157,049 barrels a day more than 1951's figure of 1,925,483 barrels. This growth in production resulted in a 57,480,000-barrel increase from 1951 output of 704,727,000 barrels to 762,207,000.

Discounting Iran, all Middle East countries reflected sizeable increases in production, save Turkey. The latter dropped 12.22 percent from a daily average production of 352 barrels to 309. Iraq, with an increase in its daily average production of 113.34 percent, accounted for a new record of 379,595 barrels. Iraq's total annual output rose from 65,122,000 to 138,932,000 barrels.

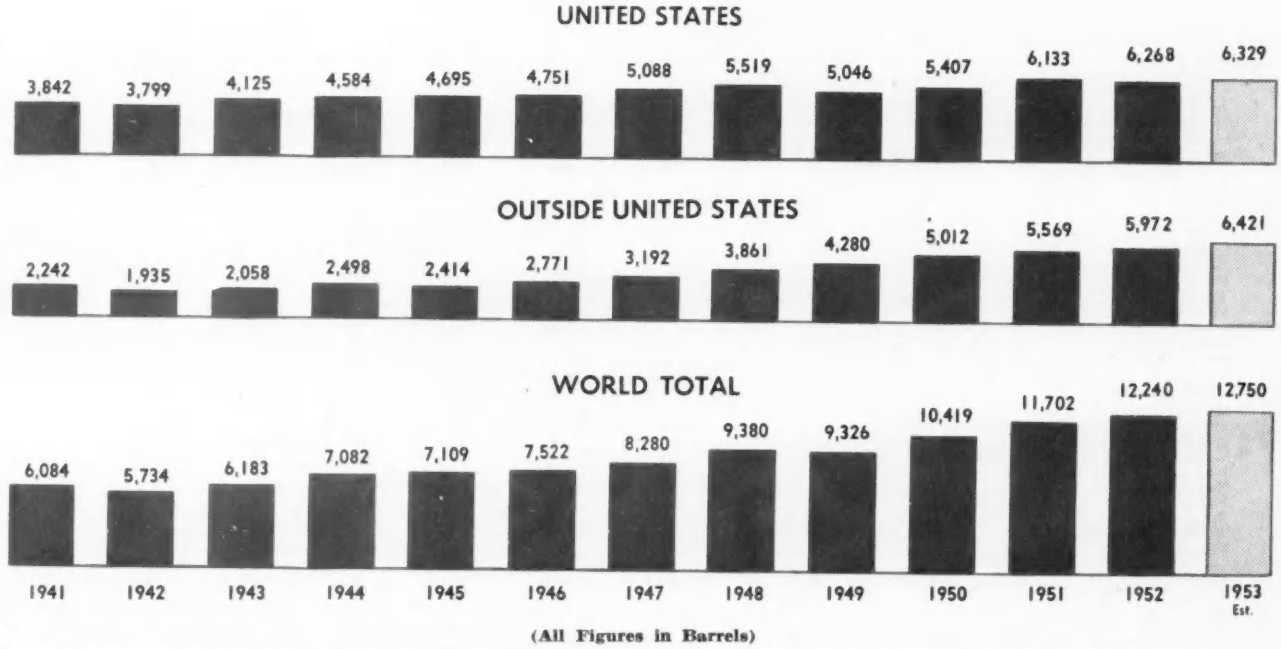
Production in Iraq's Kirkuk field in October rose to 442,800 barrels daily. For the first time, in October, crude was exported from the Ain Zalah field of the Mosul Petroleum Company, an Iraq Petroleum Company subsidiary.

The Middle East accounted for 17.02 percent of the world's total annual production, as compared with a 16.46 percent share in 1951.

The North American continent, with 54.34 percent of the world's annual production, reported a daily

WORLD CRUDE OIL PRODUCTION

(THOUSANDS OF BARRELS DAILY)



(All Figures in Barrels)

YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	503,515,000	1,378,000	355,928,000	975,000	147,587,000	403,000
1919	555,875,000	1,523,000	378,367,000	1,037,000	177,508,000	486,000
1920	688,884,000	1,887,000	442,929,000	1,213,000	245,955,000	674,000
1921	766,002,000	2,098,000	472,183,000	1,294,000	293,819,000	804,000
1922	858,898,000	2,353,000	557,531,000	1,528,000	301,367,000	825,000
1923	1,015,736,000	2,783,000	732,407,000	2,007,000	283,329,000	776,000
1924	1,014,318,000	2,779,000	713,940,000	1,956,000	300,378,000	823,000
1925	1,068,933,000	2,928,000	763,743,000	2,092,000	305,190,000	836,000
1926	1,096,823,000	3,005,000	770,874,000	2,112,000	325,949,000	893,000
1927	1,262,582,000	3,459,000	901,129,000	2,469,000	361,453,000	990,000
1928	1,324,774,000	3,629,000	901,474,000	2,469,000	423,300,000	1,160,000
1929	1,485,867,000	4,071,000	1,007,323,000	2,760,000	478,544,000	1,311,000
1930	1,410,037,000	3,863,000	898,011,000	2,460,000	512,626,000	1,403,000
1931	1,372,532,000	3,760,000	851,081,000	2,332,000	521,451,000	1,428,000
1932	1,309,677,000	3,588,000	785,159,000	2,151,000	524,518,000	1,437,000
1933	1,422,146,000	3,951,000	905,656,000	2,481,000	536,490,000	1,470,000
1934	1,522,281,000	4,170,000	908,065,000	2,488,000	614,216,000	1,682,000
1935	1,654,488,000	4,532,000	996,596,000	2,730,000	657,892,000	1,802,000
1936	1,791,540,000	4,908,000	1,099,687,000	3,013,000	691,853,000	1,895,000
1937	2,039,231,000	5,587,000	1,279,160,000	3,505,000	760,071,000	2,082,000
1938	1,988,041,000	5,446,000	1,214,355,000	3,327,000	773,686,000	2,119,000
1939	2,086,160,000	5,715,500	1,264,962,000	3,465,600	821,198,000	2,249,900
1940	2,149,821,000	5,873,800	1,353,214,000	3,697,300	796,607,000	2,176,500
1941	2,220,657,000	6,084,000	1,402,228,000	3,841,700	818,429,000	2,242,300
1942	2,093,100,000	5,734,500	1,386,645,000	3,799,000	706,455,000	1,935,500
1943	2,256,637,000	6,182,600	1,505,613,000	4,124,900	751,034,000	2,057,700
1944	2,592,289,000	7,082,700	1,677,904,000	4,584,400	914,385,000	2,498,300
1945	2,594,697,000	7,108,700	1,173,655,000	4,694,900	881,042,000	2,413,800
1946	2,745,430,000	7,521,700	1,733,939,000	4,750,500	1,011,491,000	2,771,200
1947	3,022,139,000	8,279,800	1,856,987,000	5,087,600	1,165,152,000	3,192,200
1948	3,433,226,000	9,380,400	2,020,185,000	5,519,600	1,413,041,000	3,860,800
1949	3,404,019,000	9,326,100	1,841,940,000	5,046,400	1,562,079,000	4,279,700
1950	3,802,907,000	10,418,900	1,973,574,000	5,407,000	1,829,333,000	5,011,900
1951	4,282,874,000	11,701,800	2,245,529,000	6,132,600	2,038,345,000	5,569,200
1952	4,479,750,000	12,239,800	2,294,016,000	6,267,800	2,185,734,000	5,972,000
1953 Est.	4,653,750,000	12,750,000	2,310,000,000	6,328,800	2,343,750,000	6,421,200

average output in 1952 of 6,651,660 barrels, up 2.72 percent from the previous year's daily average of 6,475,589 barrels. The continent's total production for the year spiraled to 2,434,508,000 barrels, higher by 64,442,000 barrels than production in 1951; however, last year's share in world yield dropped .99 percent below the 1951 percentage.

Again, the U. S. led the continent and the world with its daily average increase of 2.2 percent, or 6,267,802 barrels. This daily yield resulted in a rise in annual production from 2,244,529,000 barrels in 1951 to 2,294,016,000 barrels last year. Forecast for 1953 was a further rise in production to a daily average of 6,329,000—an increase of almost 1 percent.

Canadian production climbed sharply during the year as boom activity carried on to new fields and new extensions. The Canadian industry spent $300 million in exploration and development work last year, bringing to approximately $1 billion the amount spent in the Prairie provinces since discovery of Leduc field.

This progress resulted in 1952 daily average production of 168,246 barrels, a marked 28.03 percent rise from the previous year. Total annual yield was put at 61,578,000 barrels, up 13,481,000 barrels from the previous year. Thus, Canada, suffering from a continuing lack of pipe line facilities, managed to carve for itself a 1.37 percent share in the total world yield.

Venezuela again was the world's second largest crude producer, and led all other South American countries by a wide margin. Its daily average production of 1,792,472 barrels was a 5.44 percent increase over the 1951 figure of 1,700,043 barrels. This led to a yearly output of 656,045,000 barrels, 549,780,000 more than the combined production of all other South American oil-producing nations. Venezuela maintained in 1952 its 1951 share of the world's output—14.65 percent.

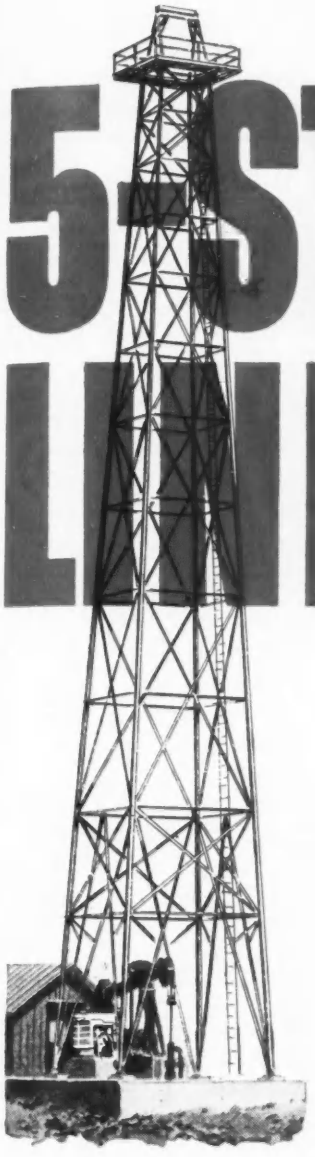
(See tables on Pages 270-274-276)

Trends in World Crude Oil Production, by Countries, and Cumulative Production Through 1952

(Sources: U. S. Bureau of Mines except 1952 partly from private sources or estimated by WORLD OIL)

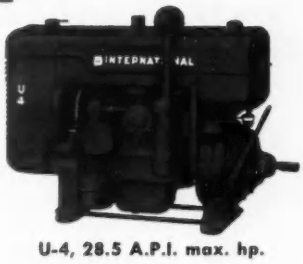
CONTINENT and COUNTRY	ANNUAL PRODUCTION (Thousands of Barrels)		DAILY AVERAGE PRODUCTION (Actual Barrels)			YEAR'S PRODUCTION As Percent of World		CUMULATIVE PRODUCTION TO January 1, 1953 (Thousands of Barrels)	
	1951	1952	1951	1952	'51-'52 % Diff.	1951	1952	Total	As % of World
North America	**2,370,066**	**2,434,508**	**6,475,589**	**6,651,660**	**+ 2.72**	**55.33**	**54.34**	**48,399,776**	**65.11**
Canada	48,097	61,578	131,413	168,246	+ 28.03	1.12	1.37	301,154	0.40
Cuba	128	120	350	328	— 6.29	.....	.....	2,529	.....
Mexico	77,312	78,794	211,234	215,284	+ 1.92	1.81	1.76	2,638,460	3.55
United States	2,244,529	2,294,016	6,132,592	6,267,802	+ 2.20	52.40	51.21	45,457,633	61.16
South America	**726,718**	**762,310**	**1,985,568**	**2,082,814**	**+ 4.90**	**16.97**	**17.02**	**8,873,842**	**11.94**
Argentina	24,465	24,337	66,844	66,495	— 0.52	0.57	0.54	506,972	0.69
Barbados	.....	.....	.....	.....	.....	.....	.....	8	.....
Bolivia	523	546	1,429	1,492	+ 4.41	0.01	0.01	6,656	0.01
Brazil	691	740	1,888	2,022	+ 7.10	0.02	0.02	2,410	.....
Chile	759	821	2,074	2,243	+ 8.15	0.02	0.02	2,209	.....
Colombia	38,403	39,297	104,926	107,369	+ 2.33	0.90	0.88	582,714	0.78
Ecuador	2,708	2,802	7,399	7,656	+ 3.47	0.06	0.06	54,540	0.08
Peru	16,110	16,857	44,016	46,057	+ 4.64	0.38	0.38	434,521	0.58
Trinidad	20,843	20,865	56,948	57,008	+ 0.11	0.48	0.46	454,805	0.61
Venezuela	622,216	656,045	1,700,043	1,792,472	+ 5.44	14.65	14.65	6,829,007	9.19
Europe	**355,674**	**386,810**	**971,787**	**1,056,858**	**+ 8.75**	**8.31**	**8.63**	**9,131,016**	**12.29**
Albania	1,200	1,010	3,279	2,760	— 15.83	0.03	0.02	20,372	0.03
Austria	14,600	17,385	39,891	47,500	+ 19.07	0.34	0.39	100,106	0.13
Czechoslovakia	650	842	1,776	2,301	+ 29.56	0.02	0.02	6,217	0.01
France	2,036	2,456	5,563	6,710	+ 20.62	0.04	0.05	19,805	0.03
Germany	9,681	12,200	26,451	33,333	+ 26.02	0.23	0.27	128,735	0.17
Great Britain	335	413	915	1,128	+ 23.28	0.01	0.01	5,558	0.01
Hungary	3,500	3,367	9,563	9,199	— 3.81	0.08	0.08	56,631	0.08
Italy	136	448	372	1,224	+229.03	.....	0.01	4,138	.....
Netherlands	4,742	5,062	13,502	13,831	+ 2.44	0.12	0.11	24,625	0.03
Poland	1,502	1,502	4,104	4,104	.....	0.03	0.03	282,822	0.39
Roumania	31,000	29,720	84,699	81,202	— 4.13	0.73	0.67	1,318,306	1.77
U.S.S.R. (Russia)	285,000	311,400	778,688	850,820	+ 9.26	6.65	6.95	7,159,148	9.63
Yugoslavia	1,092	1,005	2,984	2,746	— 7.98	0.03	0.02	4,553	0.01
Africa	**16,947**	**17,531**	**46,304**	**47,899**	**+ 3.44**	**0.39**	**0.39**	**188,409**	**0.25**
Algeria	49	293	134	800	+497.01	.....	.....	520	.....
Egypt	16,311	16,478	44,566	45,022	+ 1.02	0.38	0.37	185,664	0.25
Morocco	587	760	1,604	2,077	+ 29.49	0.01	0.02	2,225	.....
Asia, Total	**813,462**	**878,584**	**2,222,573**	**2,400,502**	**+ 8.01**	**19.00**	**19.62**	**7,732,227**	**10.41**
Asia, Middle East	**704,727**	**762,207**	**1,925,483**	**2,082,532**	**+ 8.16**	**16.46**	**17.02**	**5,481,840**	**7.38**
Bahrain	10,994	11,005	30,038	30,068	+ 0.10	0.26	0.26	142,915	0.20
Iran	127,600	10,700	348,634	29,235	— 91.62	2.98	0.24	2,524,153	3.39
Iraq	65,122	138,932	177,929	379,595	+113.34	1.52	3.10	695,973	0.94
Kuwait	204,910	274,100	559,863	748,907	+ 33.77	4.78	6.12	763,388	1.03
Qatar	18,009	24,962	49,205	68,202	+ 38.61	0.42	0.55	55,989	0.07
Saudi Arabia	277,963	302,395	759,462	826,216	+ 8.79	6.49	6.75	1,298,964	1.75
Turkey	129	113	352	309	— 12.22	0.01	.....	458	.....
Asia, Far East	**108,735**	**116,377**	**297,090**	**317,970**	**+ 7.03**	**2.54**	**2.60**	**2,250,387**	**3.03**
Burma	645	732	1,763	2,000	+ 13.44	0.02	0.02		
India	1,949	2,050	5,325	5,601	+ 5.18	0.05	0.05	351,409	0.47
Pakistan	1,348	1,647	3,683	4,500	+ 22.18	0.03	0.04		
China	730	732	1,995	2,000	+ 0.25	0.02	0.01	6,219	0.01
Indonesia	55,453	61,726	151,511	168,650	+ 11.31	1.29	1.38	1,383,350	1.86
Japan	2,337	2,143	6,385	5,855	— 8.30	0.05	0.05	102,925	0.14
New Guinea	1,746	1,812	4,770	4,951	+ 3.79	0.05	0.04	7,032	0.01
Sakhalin	7,000	7,000	19,126	19,126	.....	0.16	0.15	108,240	0.15
Sarawak-Brunei	37,506	38,520	102,475	105,246	+ 2.70	0.87	0.86	290,868	0.39
Taiwan (Formosa)	21	15	57	41	— 28.07	.....	.....	344	.....
Australia-New Zealand	**7**	**7**	**19**	**19**	.....	.....	.....	**73**	.....
World, Undistributed	.....	.....	.....	.....	.....	.....	.....	**1,044**	.....
TOTAL WORLD	**4,282,874**	**4,479,750**	**11,701,840**	**12,239,752**	**+ 4.60**	**100.00**	**100.00**	**74,326,387**	**100.00**

5 STAR LINE-UP



U-1, 10.5 A.P.I. max. hp.
at 1800 r.p.m.

U-2A, 21.8 A.P.I. max. hp.
at 1800 r.p.m.



U-4, 28.5 A.P.I. max. hp.
at 1800 r.p.m.

U-6, 37.5 A.P.I. max. hp.
at 1500 r.p.m.

U-9, 49 A.P.I. max. hp.
at 1500 r.p.m.

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World Crude Oil Production, By Countries, By Years (Part 1)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated.)

World and North America, 1857-1895

YEAR	World Total	Percent Produced by U. S.	Canada	United States	Total North America
1856	....	....	....	....	....
1857	2	....	....	....	....
1858	4	....	....	....	....
1859	6	31	....	2	2
1860	509	98	....	500	500
1861	2,131	99	....	2,114	2,114
1862	3,092	99	12	3,057	3,069
1863	2,763	94	83	2,611	2,694
1864	2,304	92	90	2,116	2,206
1865	2,716	92	110	2,498	2,608
1866	3,899	92	175	3,598	3,773
1867	3,709	90	190	3,347	3,537
1868	3,990	91	200	3,646	3,846
1869	4,696	90	220	4,215	4,435
1870	5,799	91	250	5,261	5,511
1871	5,730	91	270	5,205	5,475
1872	6,877	92	308	6,293	6,601
1873	10,838	91	365	9,894	10,259
1874	11,933	92	169	10,927	11,096
1875	9,977	88	220	8,788	9,008
1876	11,051	83	312	9,133	9,445
1877	15,754	85	312	13,350	13,662
1878	18,417	84	312	15,397	15,709
1879	23,601	84	575	19,914	20,489
1880	30,018	88	350	26,286	26,636
1881	31,993	86	275	27,661	27,936
1882	35,704	85	275	30,350	30,625
1883	30,255	78	250	23,450	23,700
1884	35,969	67	250	24,218	24,468
1885	26,765	59	250	21,859	22,109
1886	47,243	59	584	28,065	28,649
1887	47,807	59	526	28,283	28,809
1888	52,165	53	695	27,612	28,307
1889	61,507	57	705	35,164	35,869
1890	76,633	60	795	45,824	46,619
1891	91,100	60	755	54,293	55,048
1892	88,739	57	780	50,515	51,295
1893	92,038	53	798	48,431	49,229
1894	89,337	55	829	49,344	50,173
1895	103,692	51	726	52,892	53,618

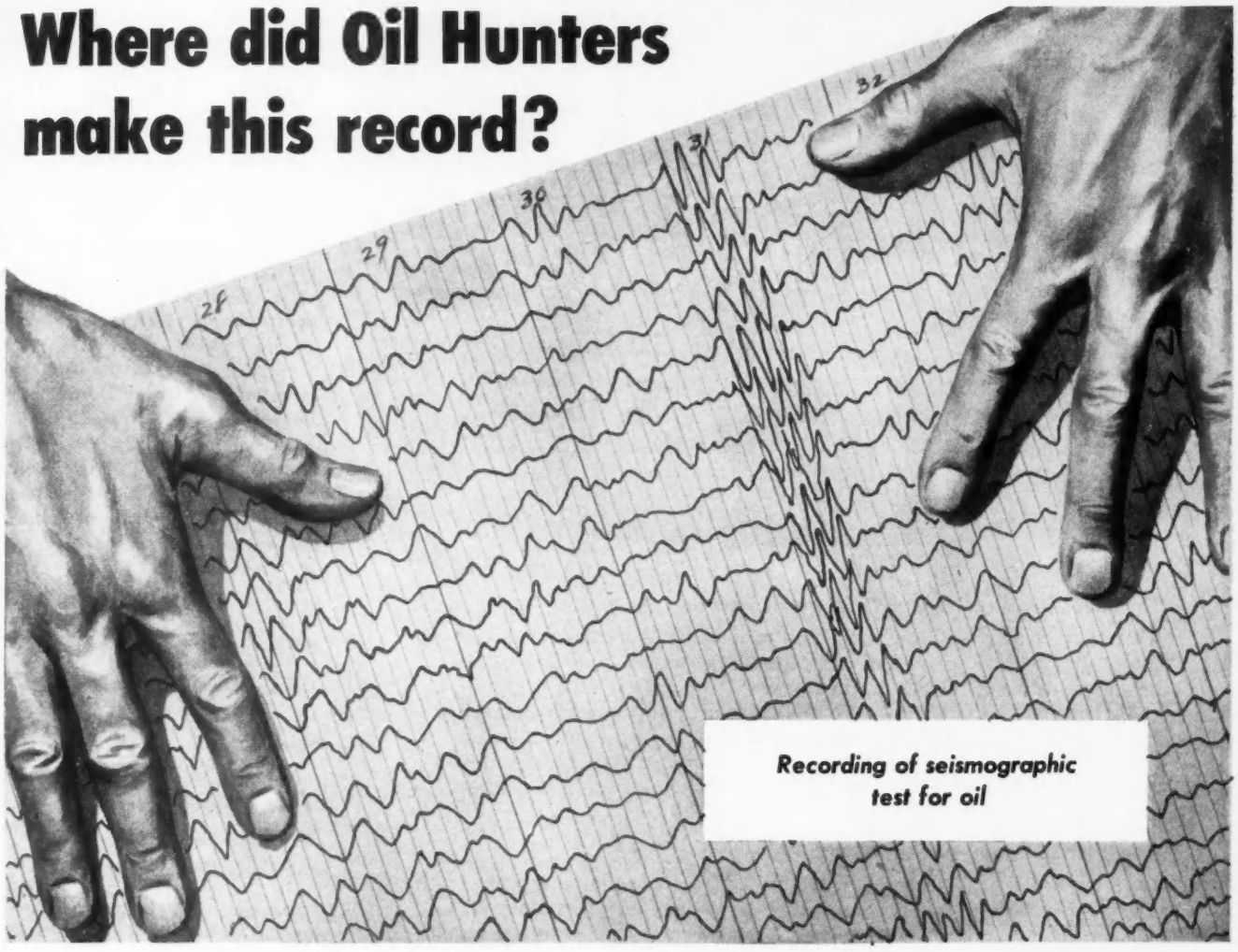
World and North America, 1896 to Now

South America, Since Beginning in 1896

YEAR	WORLD TOTAL	Percent Produced by U.S.	NORTH AMERICA					Argentina	Barbadoes	Bolivia	Brazil	Chile	Colombia	Ecuador	Peru	Trinidad	Venezuela	Total South America
			Canada	Mexico	United States	Cuba	Total North America											
1896	114,199	53	727	.....	60,960	.....	61,687	.....	.....	.....	.....	.....	.....	.....	47	.....	.....	47
1897	121,992	50	710	.....	60,476	.....	61,186	.....	.....	.....	.....	.....	.....	.....	71	.....	.....	71
1898	124,979	44	758	.....	55,364	.....	56,122	.....	.....	.....	.....	.....	.....	.....	71	.....	.....	71
1899	131,147	44	808	.....	57,071	.....	57,879	.....	.....	.....	.....	.....	.....	.....	89	.....	.....	89
1900	149,137	43	913	.....	63,621	.....	64,534	.....	.....	.....	.....	.....	.....	.....	274	.....	.....	274
1901	167,440	41	757	10	69,389	.....	70,156	.....	.....	.....	.....	.....	.....	.....	275	.....	.....	275
1902	181,809	49	531	40	88,767	.....	89,338	.....	.....	.....	.....	.....	.....	.....	287	.....	.....	287
1903	194,879	52	487	75	100,461	.....	101,023	.....	.....	.....	.....	.....	.....	.....	278	.....	.....	278
1904	217,948	54	553	126	117,081	.....	117,760	.....	.....	.....	.....	.....	.....	.....	290	.....	.....	290
1905	215,091	63	634	251	134,717	.....	135,602	.....	.....	.....	.....	.....	.....	.....	373	.....	.....	373
1906	213,263	59	569	502	126,494	.....	127,565	.....	.....	.....	.....	.....	.....	.....	531	.....	.....	531
1907	263,957	63	789	1,005	166,095	.....	167,889	B	.....	.....	.....	.....	.....	.....	751	.....	.....	751
1908	285,287	63	528	3,933	178,527	.....	182,988	12	.....	.....	.....	.....	.....	.....	945	B	.....	957
1909	298,709	61	421	2,714	183,171	.....	186,306	18	.....	.....	.....	.....	.....	.....	1,411	57	.....	1,486
1910	327,763	64	316	3,634	209,557	.....	213,507	20	.....	.....	.....	.....	.....	.....	1,258	143	.....	1,421
1911	344,361	64	291	12,553	220,449	.....	233,293	13	.....	.....	.....	.....	.....	.....	1,465	285	.....	1,763
1912	352,443	63	243	16,558	222,935	.....	239,736	47	.....	.....	.....	.....	.....	.....	1,752	437	.....	2,236
1913	385,345	64	228	25,696	248,446	.....	274,370	131	.....	.....	.....	.....	.....	.....	2,071	504	.....	2,706
1914	407,544	65	215	26,235	265,763	.....	292,213	276	.....	.....	.....	.....	.....	.....	1,837	644	.....	2,757
1915	432,033	65	215	32,911	281,104	.....	314,230	513	.....	.....	.....	.....	.....	.....	2,579	750	.....	3,842
1916	457,500	66	198	40,546	300,767	.....	341,511	867	.....	.....	.....	.....	.....	.....	2,593	929	.....	4,389
1917	502,891	67	214	55,293	335,316	.....	390,823	1,218	.....	.....	.....	.....	.....	57	2,577	1,602	120	5,574
1918	503,515	71	305	63,828	355,928	.....	420,061	1,353	.....	.....	.....	.....	.....	C60	2,527	2,082	333	6,355
1919	555,875	68	241	87,073	378,367	.....	465,681	1,331	.....	.....	.....	.....	.....	C60	2,628	1,841	425	6,285
1920	688,884	64	196	157,069	442,929	.....	600,194	1,651	.....	.....	.....	.....	.....	C60	2,817	2,083	457	7,068
1921	766,002	62	188	193,398	472,183	.....	665,769	2,036	.....	.....	.....	.....	67	C60	3,699	2,354	1,433	9,649
1922	858,898	65	179	182,278	557,531	.....	739,988	2,866	.....	.....	.....	.....	323	C60	5,314	2,445	2,201	13,209
1923	1,015,736	72	170	149,585	732,407	.....	882,162	3,400	.....	.....	.....	.....	425	87	5,699	3,051	4,201	16,863
1924	1,014,318	70	161	139,678	713,940	.....	853,779	4,639	.....	.....	.....	.....	445	C100	8,379	4,057	9,042	26,662
1925	1,068,933	71	332	115,515	763,743	.....	879,590	6,336	.....	.....	.....	.....	1,007	160	9,232	4,387	19,687	40,809
1926	1,096,823	70	364	90,421	770,874	.....	861,659	7,851	.....	.....	.....	.....	6,444	214	10,762	4,971	36,911	67,153
1927	1,262,582	71	477	64,121	901,129	.....	965,727	8,630	.....	.....	.....	.....	15,014	537	10,127	5,380	63,134	102,822
1928	1,324,774	68	624	50,151	901,474	.....	952,249	9,070	.....	.....	.....	.....	19,897	1,084	12,006	7,684	105,749	155,490
1929	1,485,867	68	1,117	44,688	1,007,323	.....	1,053,128	9,391	.....	B	.....	.....	20,385	1,381	13,422	8,716	137,472	190,767
1930	1,410,037	64	1,522	39,530	898,011	.....	939,063	9,002	.....	56	.....	.....	20,346	1,553	12,449	9,419	136,669	189,494
1931	1,372,532	62	1,543	33,039	851,081	.....	885,663	11,709	.....	25	.....	.....	18,237	1,762	10,089	9,744	116,613	168,179
1932	1,309,677	60	1,044	32,805	785,159	.....	819,008	13,139	.....	44	.....	.....	16,414	1,597	9,899	10,126	116,541	167,760
1933	1,442,146	63	1,145	34,001	905,656	23	940,825	13,691	.....	112	.....	.....	13,158	1,620	13,257	9,561	117,720	169,119
1934	1,522,288	60	1,417	38,172	908,065	28	947,682	14,024	.....	159	.....	.....	17,341	1,637	16,314	10,894	136,103	196,472
1935	1,654,495	60	1,447	40,241	996,596	47	1,038,331	14,297	.....	164	.....	.....	17,598	1,732	17,067	11,671	148,254	210,783
1936	1,791,546	61	1,500	41,028	1,099,687	62	1,142,277	15,458	.....	105	.....	.....	18,756	1,942	17,593	13,237	154,794	221,885
1937	2,039,231	63	2,944	46,907	1,279,160	33	1,329,044	16,355	.....	122	.....	.....	20,599	2,161	17,457	15,503	186,230	258,427
1938	1,988,041	61	6,966	38,506	1,214,355	78	1,259,905	17,076	.....	226	.....	.....	21,582	2,246	15,839	17,737	188,174	262,880
1939	2,086,160	60.6	7,838	42,898	1,264,962	112	1,315,810	18,613	.....	215	.....	.....	23,857	2,313	13,508	19,270	206,470	284,246
1940	2,149,821	62.9	8,591	44,036	1,353,214	142	1,405,983	20,609	.....	288	2	.....	25,593	2,349	12,126	22,227	185,570	268,764
1941	2,220,657	63.1	10,134	42,196	1,402,228	150	1,454,708	21,873	.....	235	3	.....	24,553	1,557	11,935	20,506	228,430	309,092
1942	2,093,100	66.2	10,365	34,815	1,386,645	151	1,431,976	23,704	2	308	33	.....	10,487	2,278	13,629	22,069	147,675	220,185
1943	2,256,637	66.7	10,052	35,163	1,505,613	107	1,550,935	27,714	2	334	48	.....	13,261	2,315	14,654	21,385	177,631	257,344
1944	2,592,289	64.7	10,099	38,203	1,677,904	109	1,726,315	24,230	1	314	58	.....	22,291	2,967	14,389	22,139	257,046	343,435
1945	2,594,697	66.0	8,483	43,547	1,713,655	149	1,765,834	22,881	2	382	79	.....	22,449	2,664	13,744	21,093	323,156	406,450
1946	2,745,430	63.2	7,586	49,235	1,733,939	269	1,791,029	20,604	1	363	67	.....	22,118	2,323	12,468	20,233	388,486	466,663
1947	3,022,139	61.4	7,692	56,284	1,856,987	300	1,921,263	21,846	B	377	97	.....	24,794	2,282	12,764	20,521	434,905	517,586
1948	3,433,226	58.8	12,287	58,508	2,020,185	159	2,091,139	23,734	B	464	144	.....	23,792	2,563	14,069	20,111	490,015	574,892
1949	3,404,019	54.1	21,305	60,910	1,841,940	206	1,924,361	22,589	.....	678	109	.....	29,722	2,617	14,790	20,617	482,316	573,438
1950	3,802,907	51.9	29,044	72,443	1,973,574	156	2,075,217	23,353	.....	616	339	629	34,059	2,632	15,077	20,632	546,783	644,120
1951	4,282,874	52.4	48,097	77,312	2,244,529	128	2,370,066	24,465	.....	523	691	759	38,403	2,708	16,110	20,843	622,216	726,718
1952	4,479,750	51.2	61,578	78,794	2,294,016	120	2,434,508	24,337	.....	546	740	821	39,297	2,802	16,857	20,865	656,045	762,310
Total	74,326,387	61.2	391,154	2,638,460	45,457,633	2,529	48,399,776	506,972	8	6,656	2,410	2,209	582,714	54,540	434,521	454,805	6,829,007	8,873,842

* WORLD OIL from private sources. B Less than 1,000 barrels. C Estimated production.

Where did Oil Hunters make this record?



Recording of seismographic test for oil

4 to 10—It's in Canada!

More than 4 out of 10—44.7%, in fact—of all geophysical crews searching for oil outside the U.S. in 1951 were operating in Canada.

Quick and reliable information can be an important advantage in this keen competition for Canada's rich oil prizes. With 131 branches in the oil provinces alone, Canada's First Bank is on the ground to answer your questions, as well as provide flexible financial service.

ASK THE BofM ABOUT . . .
Canadian Company Formation
Reservations of Oil and Gas Rights
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NO STOCK RECOMMENDATIONS

While the Bank is prepared to provide all available information on the oil industry, it does not *make recommendations regarding the purchase of individual oil stocks.*

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TO A MILLION CANADIANS
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BAKER

*now offers not one, not two, but **THREE** ranges of*

Hinge-Lok Casing Centralizers

. . . with increased reach (bowed height) of springs to provide AMPLE ALL-AROUND cementing space for ALL casing programs, and VARYING hole sizes and conditions, PLUS unsurpassed convenience and ease of installation.

"Reach" (Bowed Height) is vital factor

All Baker HINGE-LOK Casing Centralizers have greater reach (or bowed height) of springs in corresponding ranges than any other casing centralizers on the market.

Increased reach means adequate, all-around cementing space even though the hole size varies considerably from the drill bit size. Without this increased reach, it is quite probable that casing may contact the wall of the hole between centralizers resulting in a poor cement job at that point.

Hinged for easy mounting

Baker HINGE-LOK Casing Centralizers can be *installed in a matter of seconds* while running-in, as *no welding is required*. Just close the HINGE-LOK Centralizer *around a coupling* and then insert drive nails which *thread themselves* into the hinge knuckles, and *will not come out*. When exact spacing is desired, easily installed Stop Rings can be plug-welded at required positions.

Maximum effective centering force

Baker HINGE-LOK Casing Centralizers provide the most uniform annular cementing space around the casing. And this cementing space is present regardless of repeated flattening of the springs in a deep well, or of off-vertical condition of the hole.

The engineered bow shape of the springs, with an ideal relationship between the length and the bowed height of the springs, provides *greater landed centering force* than can be obtained from any other available hinge-type centralizer covering the same range of hole sizes.

All springs work together

All of the powerful springs of Baker HINGE-LOK Casing Centralizers work together to offer a combined positive resistance against any tendency of the casing to contact the wall of the open hole. As the springs are forced toward the casing by contact with the wall of the hole, their effective length is decreased, thereby stiffening them and increasing their resistance to further deflection.

Unlimited rotation of casing

Whether Baker HINGE-LOK Casing Centralizers are installed around couplings or over a standard Stop Ring, the casing can be freely rotated without rotation of the centralizers.

Easy starting without snubbing

The superior spring design of Baker HINGE-LOK Casing Centralizers assures easy starting without sacrificing the powerful centering force delivered after full down-hole travel of the casing. By following the easily read "Starting Force Spacing Guide," all need for applying external starting force is eliminated even in relatively close-tolerance programs.

BAKER MODEL "H" 20 Range HINGE-LOK Casing Centralizer

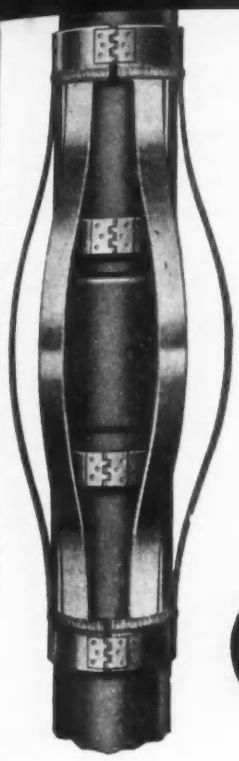
PRODUCT NO. 9112

Recommended where LESS-THAN-NORMAL CLEARANCE exists between the casing ON which the centralizers are mounted and the casing THROUGH which the centralizers are run. If the formation is such as to create special problems of over-size or irregularity of the open hole, it is often advisable to run the "H-20" Centralizer on the first few joints—for ease in starting—followed by the "H-25" or the "H-50" Super-Range Centralizer.

BAKER MODEL "H" 25 Range HINGE-LOK Casing Centralizer

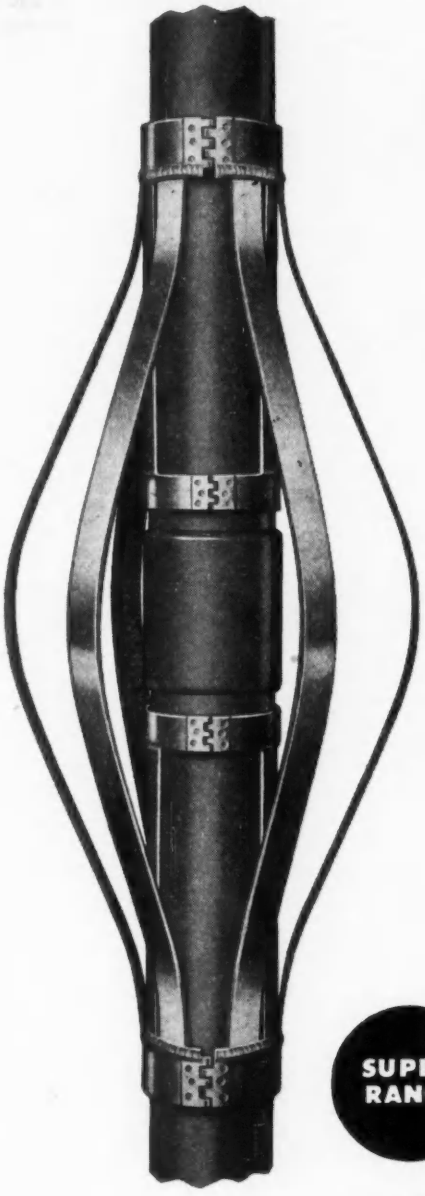
PRODUCT NO. 9113

Recommended where NORMAL CLEARANCE is present, and no serious problem of over-size hole is anticipated. The "H-25" Centralizer is recommended where conditions are such that starting force would be a problem with the "H-50" Super-Range Centralizer, in which case the H-25 might be used on the first few joints and the H-50 run above it. Although the H-50 requires a larger spacing interval for easy starting than the H-20 or the H-25, fewer "H-50" Centralizers—with their superior reach—ensure even greater effective centering force.



20 RANGE

25 RANGE



SUPER-RANGE

BAKER MODEL "H-50"
Super-Range HINGE LOK
Casing Centralizer

PRODUCT NO. 9114

Recommended for GREATER-THAN-NORMAL CLEARANCE—wherever the diametral clearance between the casing ON which the centralizers are mounted, and the casing THROUGH which they are run exceeds five inches, or for NORMAL CLEARANCE where extensive hole irregularities are anticipated. No other centralizer can provide such effective centering action as the "H-50" in *irregular or over-size hole sections, or in cavities.* By increasing the bow of the springs (without proportionately increasing their resistance to starting) maximum centering efficiency is assured, regardless of individual well conditions.

BE SURE YOU GET

Maximum Centering Force

THROUGHOUT THE ZONE

TO BE CEMENTED

Always *pulled*—never pushed

Baker HINGE-LOK Casing Centralizers are always "pulled" during upward or downward travel of the casing in the well. This feature is important when the centralizer passes through any tight spots in the hole—and is especially advantageous when reciprocating casing during cementing operations.

Call Baker for Centralizer service

Any Baker representative, or office, is ready to give you the kind of service every operator appreciates—sincere, courteous assistance to help you get successful "first-time" cementing results.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

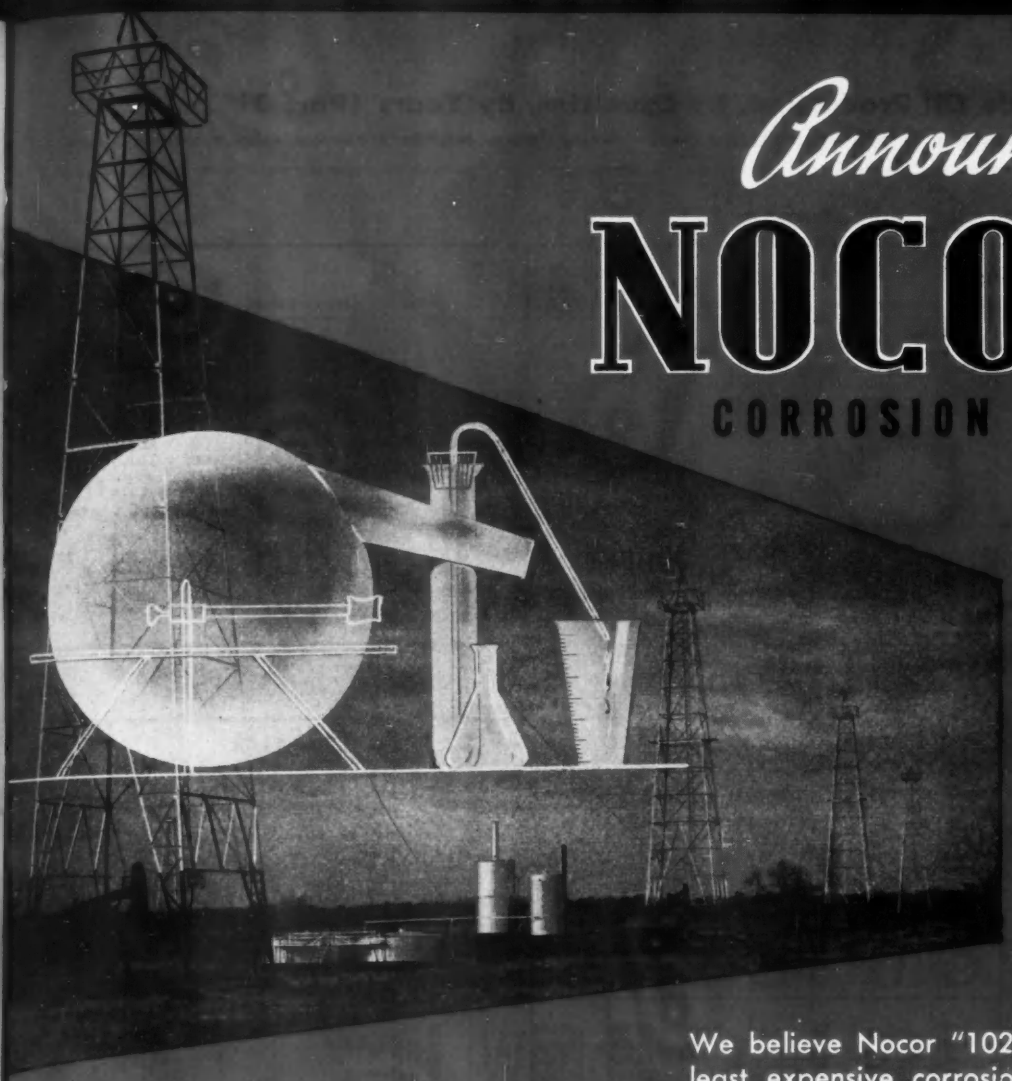
World Crude Oil Production, By Countries, By Years (Part 2)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated.)

Asia Since Beginning in 1875

	ASIA—Middle East								ASIA—Far East											
Year	Bahrain	Iran	Iraq	Kuwait	Qatar	Saudi Arabia	Turkey	Middle East Total	[E]Burma-India Pakistan Burma	Pakistan	India	China	Indonesia	Japan	New Guinea	Sakhalin	Sarawak-Brunei	[H]Taiwan (Formosa)	Total Far East	[F]Total Asia
1874																				
1875														5					5	5
1876														7					7	7
1877														10					10	10
1878														18					18	18
1879														23					23	23
1880														26					26	26
1881														17					17	17
1882														15					15	15
1883														20					20	20
1884														28					28	28
1885														30					30	30
1886														38					38	37
1887														29					29	28
1888														37					37	39
1889														53					147	147
1890										94				52					170	170
1891										118										
1892										190				53					243	243
1893										242				69					311	311
1894										299			600	106					1,005	1,005
1895										327			688	173					1,188	1,188
1896										372			1,216	170					1,758	1,758
1897										430			1,427	237					2,094	2,094
1898										546			2,552	262					3,360	3,360
1899										542			2,964	319					3,825	3,825
1900										941			1,796	539					3,276	3,276
1901										1,079			2,253	871					4,203	4,203
1902										1,431			4,014	1,117					6,562	6,562
1903										1,617			2,430	996					5,043	5,043
1904										2,510			5,770	1,209					9,489	9,489
1905										3,385			6,508	1,219					11,112	11,112
1906										4,137			7,850	1,347					13,334	13,334
1907										4,016			8,181	1,564					13,761	13,761
1908										4,344			9,983	1,718					16,045	16,045
1909										5,047			10,283	1,871					17,201	17,201
1910										6,677			11,042	1,887					19,606	19,606
1911										6,138			11,031	1,829					18,998	18,998
1912										6,451			12,173	1,737					20,361	20,361
1913		1,857						1,857		7,117			10,846	1,659					19,622	19,622
1914		2,910						2,910		7,930			11,172	1,940		141			21,183	23,040
1915		3,616						3,616		7,410			11,422	2,636		318			21,786	24,696
1916		4,477						4,477		8,202			11,920	2,928		392			23,442	27,058
1917		7,147						7,147		8,491			12,547	2,963		629			24,630	29,107
1918		8,623						8,623		8,079			13,180	2,861		542			24,662	31,809
1919		10,139						10,139		8,188			12,778	2,441		504			23,911	32,534
1920		12,230						12,230		8,736			15,508	2,238		596			27,078	37,217
1921		16,673						16,673		8,375			17,529	2,221		1,020			29,145	41,375
1922		22,247						22,247		8,734			16,958	2,233		1,411			29,338	46,011
1923		25,230						25,230		8,529			17,066	2,055	2	2,849			30,506	52,753
1924		32,373						32,373		8,406			19,870	1,804	7	3,940			34,029	59,259
1925		35,038						35,038		8,416			20,473	1,814	9	4,163			34,946	67,319
1926		35,842						35,842		8,274			21,422	1,915	80	4,257			35,955	70,993
1927		39,688	338					40,026		8,011			21,243	1,785	87	4,942			36,162	72,004
1928		43,461	713					44,174		8,032			27,459	1,789	181	4,943			42,663	82,689
1929		42,145	798					42,943		8,741			32,118	1,944	440	[G]5,223			48,703	92,877
1930		45,828	913					46,741		8,747			39,279	2,023	677	[D]5,290			56,473	99,416
1931		44,376	830					45,206		8,292			41,729	1,950	[D]1,134	4,907			58,683	105,424
1932		49,471	836					50,307		8,200			35,539	2,050	[D]1,805	2,734	3,854		52,377	97,583
1933	31	54,392	917					55,340		8,817			39,001	1,630		2,631	3,796		55,875	106,182
1934	285	57,851	7,689					65,825		8,743			42,606	1,455		2,338	4,490		59,632	114,972
1935	1,265	57,273	27,408					85,946	7,181	10,503			46,925	1,834		2,881	5,140		67,283	133,108
1936	4,645	62,718	30,406			20		97,789	7,588	E	2,038		47,171	2,249		2,545	5,546		66,730	152,676
1937	7,762	77,804	31,836			65		117,467	7,848	E	1,978		50,025	2,440		3,212	5,209		70,452	168,241
1938	8,298	78,372	32,643			495		119,808	7,538	E	2,162		56,724	2,488		3,656	6,009		78,887	196,354
1939	7,589	78,151	30,791			3,934		120,465	7,873	E	2,488		57,318	2,511		[C]3,821	6,913		80,589	200,397
1940	7,074	66,317	24,225			5,075		102,691	7,731	E	2,327	4	62,087	2,654		4,000	7,097		86,042	206,507
1941	6,794	50,777	12,650			4,310		74,531	7,762	E	2,302	10	62,011	2,639		4,000	7,047		85,740	188,431
1942	6,241	72,256	19,726			4,530		102,753	2,500	E	2,899	87	53,704	1,929		4,000	6,864	62	77,307	151,838
1943	6,572	74,612	24,848			4,868		110,900	1,000	E	2,792	340	24,000	1,652		4,000	3,000	48	38,332	141,085
1944	6,714	102,045	30,943			7,794		147,496	750	E	2,735	447	48,294	1,727		5,000	4,500	38	63,741	174,641
1945	7,309	130,526	35,112			21,311		194,258	725	E	2,784	505	22,260	1,601		5,000	6,000	40	38,940	186,436
1946	8,010	146,819	35,665	5,931		59,944		256,369	15	E	2,363	484	7,600	1,544		6,000	2,100	14	20,830	215,088
1947	9,411	154,998	35,834	16,225		89,852		306,320	59	356	2,193	513	2,100	1,343		6,000	2,050	16	14,230	270,599
1948	10,915	190,384	26,115	46,500		142,853	13	416,780	341	490	1,863	374	8,020	1,276		[C]7,000	12,970	22	31,940	338,260
1949	10,985	204,712	30,957	90,000	750	174,008	95	511,507	248	824	1,875	533	31,900	1,122		7,000	20,124	23	63,408	480,188
1950	11,016	242,475	49,726	125,722	12,268	199,547	108	640,862	450	1,281	1,906	730	43,206	1,353	1,726	7,000	25,108	22	82,123	593,630
1951	10,994	127,600	65,122	204,910	18,009	277,963	129	704,727	645	1,348	1,867	730	48,400	2,048	1,748	7,000	30,958	23	94,505	735,367
1952	11,005	10,700	138,932	274,100	24,962	302,395	113	762,207	732	1,647	2,050	732	61,726	2,143	1,812	7,000	38,520	15	116,377	878,584
Total	142,915	2,524,153	695,973	763,388	55,989	1,298,964	458	5,481,840		351,409		6,219	1,383,350	102,925	7,032	108,240	290,868	344	2,250,387	7,732,227

* **WORLD OIL** from private sources. [B] Less than 1,000 barrels. [C] Estimated production [D] Year ended September 30. [E] Separation of British India and Burma prior to 1935 not available from U.S. Bureau of Mines data used here. Data by Dudley Stamp in "Petroleum Development and Technology, 1933" and in A.I.M.E. "Transactions" indicate cumulative through 1934 as follows: Burma 184,528, India, 20, 756. Pakistan included with India prior to 1947. [F] Exclusive of U.S.S.R. fields in Asia, other than Sakhalin, which are included with U.S.S.R. in Europe. [G] Beginning of production in Brunei. [H] Formosa included with Japan prior to 1941.



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NOCOR 102
CORROSION INHIBITOR

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We believe Nocor "102" to be the most effective, least expensive corrosion inhibitor yet developed. Nocor "102" forms a more impervious, tighter film barrier, a chemical bond between product and steel . . . is soluble in all proportions in oil . . . treats many oil emulsions . . . is a new advance in "wettability" . . . controls dispersability to increase efficiency of the inhibitor . . . will not aggravate scale problems . . . is non-irritating, non-toxic . . . cannot contaminate finished products.

Nocor "102" is another result of Cardinal's unending research to make good things even better.

Detailed literature and samples upon request.

Complete Advisory Service

Crude oils, brines and production conditions vary widely from field-to-field. Corrosion inhibitors therefore cannot be expected to render identical performance without certain custom treatments to counteract individual conditions.

The manufacturers of Nocor "102" offer, without obligation, rate of corrosion test services, field service on initial application, and full consultation and advisory facilities.

Advisory service without obligation upon request.

Write for name and address of representative nearest you

CARDINAL CHEMICAL · INC.

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Phone 644

World Crude Oil Production, By Countries, By Years (Part 3)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated.)

Europe, 1857-1900

YEAR	Italy	Roumania	[F] U.S.S.R. (Russia)	[F] Total Europe	YEAR	Germany	Italy	Poland	Roumania	[F] U.S.S.R. (Russia)	[F] Total Europe	YEAR	Germany	Italy	Poland	Roumania	[F] U.S.S.R. (Russia)	[F] Total Europe
1856	....	....	....	....	1871	....	[B]	....	90	165	255	1886	74	2	306	168	18,006	18,556
1857	....	2	....	2	1872	....	[B]	....	91	185	276	1887	74	1	344	182	18,368	18,969
1858	....	4	....	4	1873	....	[B]	....	104	475	579	1888	85	1	467	219	23,049	23,821
1859	....	4	....	4	1874	....	1	150	103	583	837	1889	68	1	515	298	24,609	25,491
1860	....	9	....	9	1875	....	1	158	108	697	964	1890	108	3	659	383	28,691	29,844
1861	[B]	17	....	17	1876	....	3	164	111	1,321	1,599	1891	109	8	631	488	34,573	35,809
1862	[B]	23	....	23	1877	....	3	170	108	1,801	2,082	1892	101	18	646	593	35,775	37,133
1863	[B]	28	41	69	1878	....	4	176	109	2,401	2,690	1893	100	19	693	535	40,457	41,804
1864	[B]	33	65	98	1879	....	3	215	110	2,761	3,089	1894	123	21	949	508	36,375	37,976
1865	2	39	67	108	1880	9	2	229	115	3,001	3,356	1895	121	26	1,453	576	46,140	48,316
1866	1	42	83	126	1881	29	1	287	122	3,601	4,040	1896	145	18	2,444	543	47,221	50,371
1867	1	51	120	172	1882	58	2	330	136	4,538	5,064	1897	166	14	2,226	571	54,399	57,376
1868	[B]	56	88	144	1883	27	2	365	139	6,002	6,535	1898	184	15	2,376	776	61,610	64,961
1869	[B]	59	202	261	1884	46	3	408	211	10,805	11,473	1899	192	16	2,314	1,426	65,955	69,903
1870	[B]	84	204	288	1885	41	2	465	193	13,925	14,626	1900	358	12	2,347	1,629	75,780	80,126

Europe and Africa, 1901-1952

	EUROPE													AFRICA					
YEAR	Albania	Austria	Czecho-slovakia	Great Britain	France	Ger-many	Hun-gary	Italy	Nether-lands	Poland	Rou-mania	[F] U.S.S.R. (Russia)	Yugo-slavia	[F] Total Europe	Egypt	Al-geria	Mo-rocco	Total Africa	Austra-lia-N. Zealand	Rest of World
1901	.....	.....	.....	.....	.....	314	.....	16	.....	3,251	1,678	85,168	.....	90,427	.....	.....	.....	.....	.....	20
1902	.....	.....	.....	.....	.....	354	.....	19	.....	4,142	2,060	80,540	.....	87,115	.....	.....	.....	.....	.....	26
1903	.....	.....	.....	.....	.....	446	.....	18	.....	5,235	2,763	75,591	.....	84,053	.....	.....	.....	.....	.....	34
1904	.....	.....	.....	.....	.....	637	.....	26	.....	5,947	3,599	78,537	.....	88,746	.....	.....	.....	.....	.....	40
1905	.....	.....	.....	.....	.....	561	.....	44	.....	5,766	4,421	54,960	.....	65,752	.....	.....	.....	.....	.....	30
1906	.....	.....	.....	.....	.....	579	.....	54	.....	5,468	6,378	58,897	.....	71,376	.....	.....	.....	.....	.....	30
1907	.....	.....	.....	.....	.....	757	.....	60	.....	8,456	8,118	61,851	.....	79,242	.....	.....	.....	.....	.....	30
1908	.....	.....	.....	.....	.....	1,009	.....	51	.....	12,612	8,252	62,187	.....	84,111	.....	.....	.....	.....	.....	30
1909	.....	.....	.....	.....	.....	1,019	.....	42	.....	14,933	9,327	65,970	.....	91,291	.....	.....	.....	.....	.....	20
1910	.....	.....	.....	.....	.....	1,032	.....	51	.....	12,673	9,724	70,337	.....	93,817	.....	.....	.....	.....	.....	20
1911	.....	.....	.....	.....	.....	1,017	.....	75	.....	10,519	11,108	66,184	.....	88,903	21	.....	.....	21	.....	20
1912	.....	.....	.....	.....	.....	1,031	.....	54	.....	8,535	12,976	68,019	.....	90,615	214	.....	.....	214	.....	20
1913	.....	.....	.....	.....	.....	857	.....	47	.....	7,818	13,555	62,834	.....	85,111	98	.....	.....	98	.....	20
1914	.....	.....	.....	.....	.....	781	.....	40	.....	6,436	12,827	67,020	.....	87,104	753	1	.....	754	.....	20
1915	.....	.....	.....	.....	.....	703	.....	44	.....	5,352	12,030	68,548	.....	86,677	212	4	.....	216	.....	10
1916	.....	.....	.....	.....	.....	656	.....	51	.....	6,587	8,945	65,817	.....	82,056	404	8	.....	412	.....	25
1917	.....	.....	.....	.....	[G]	642	.....	41	.....	6,228	3,721	63,072	.....	73,704	943	9	.....	952	.....	29
1918	.....	.....	.....	.....	363	270	.....	35	.....	6,032	8,730	27,168	.....	42,598	1,935	7	.....	1,942	.....	25
1919	.....	.....	48	2	334	265	.....	35	.....	6,096	6,618	31,752	.....	45,150	1,517	5	.....	1,522	.....	20
1920	.....	.....	69	3	356	246	.....	35	.....	5,607	7,435	25,430	.....	39,181	1,042	4	.....	1,046	.....	20
1921	.....	.....	94	3	389	274	.....	32	.....	5,167	8,368	28,968	.....	43,295	1,255	3	.....	1,258	.....	20
1922	.....	.....	120	1	496	319	.....	31	.....	5,227	9,843	35,692	.....	51,729	1,188	9	.....	1,197	.....	22
1923	.....	.....	74	1	494	346	.....	34	.....	5,402	10,867	39,147	.....	56,365	1,054	9	.....	1,063	.....	24
1924	.....	.....	76	2	497	406	.....	39	.....	5,657	13,369	45,355	.....	65,401	1,122	11	.....	1,133	.....	24
1925	.....	.....	158	3	459	541	.....	61	.....	5,960	16,650	52,448	.....	76,280	1,226	12	.....	1,238	.....	23
1926	.....	.....	150	2	478	653	.....	41	.....	5,844	23,314	64,311	.....	94,793	1,188	9	.....	1,197	.....	17
1927	.....	.....	112	2	504	663	.....	47	.....	5,342	26,368	77,018	.....	110,056	1,267	8	.....	1,275	.....	13
1928	.....	.....	94	1	512	630	.....	46	.....	5,492	30,773	[D]84,745	.....	122,293	1,842	8	.....	1,850	.....	15
1929	.....	.....	93	.....	535	704	.....	45	.....	4,988	34,758	[D]99,507	.....	140,630	1,868	20	.....	1,888	.....	38
1930	.....	.....	157	[B]	523	1,182	.....	59	.....	4,904	41,624	[D]125,555	.....	174,004	1,996	16	.....	2,012	.....	40
1931	.....	.....	134	[E]	520	1,606	.....	124	.....	4,662	49,127	162,842	.....	219,015	2,038	[E]	.....	2,038	.....	54
1932	.....	.....	126	[E]	530	1,608	.....	208	.....	4,116	53,815	154,367	.....	214,770	1,895	[E]	7	1,902	.....	62
1933	11	.....	122	[E]	562	1,665	.....	204	.....	4,072	54,020	154,840	.....	215,496	1,663	[E]	7	1,670	.....	71
1934	10	.....	178	[E]	557	2,187	.....	151	.....	3,913	62,063	174,318	.....	243,377	1,546	[E]	6	1,552	.....	96
1935	41	44	133	[E]	541	2,996	.....	119	.....	3,812	61,310	182,386	2	251,384	1,301	[E]	4	1,305	5	4
1936	273	50	127	[E]	503	3,115	.....	123	.....	3,789	63,659	186,206	1	257,846	1,278	[E]	4	1,282	5	4
1937	619	221	123	[E]	502	3,176	16	110	.....	3,716	52,452	193,241	4	254,180	1,196	[E]	22	1,218	4	4
1938	752	383	130	[E]	513	3,861	288	101	.....	3,763	48,487	204,956	9	263,243	1,581	[E]	27	1,608	4	4
1939	934	1,240	120	.....	500	4,487	1,103	91	.....	3,898	45,648	216,866	10	274,897	4,666	[E]	27	4,693	3	4
1940	1,497	2,808	163	124	496	7,371	1,881	85	.....	3,891	43,168	218,600	10	280,094	6,505	[E]	27	6,532	3	14
1941	1,334	4,238	183	223	414	6,303	3,183	95	.....	1,793	40,517	238,150	10	296,443	8,546	[E]	27	8,573	3	.....
1942	1,601	5,899	271	605	463	5,191	5,037	101	.....	2,794	42,094	227,470	10	291,536	8,275	[E]	41	8,316	2	.....
1943	1,001	7,478	200	839	356	4,973	6,347	86	1	3,500	39,182	200,750	10	264,723	8,953	.....	39	8,992	2	.....
1944	334	8,218	185	703	300	6,154	6,277	55	12	3,000	26,191	275,000	220	326,649	9,416	4	32	9,452	2	.....
1945	267	3,074	91	532	202	3,935	5,018	53	41	750	34,772	148,953	200	197,888	9,406	2	26	9,434	3	.....
1946	1,000	5,734	196	412	368	4,539	5,146	83	435	866	31,434	157,673	160	208,046	9,070	1	20	9,091	2	.....
1947	2,000	6,285	210	351	356	4,032	4,330	81	1,478	951	28,552	187,463	290	236,379	8,627	1	21	8,649	2	.....
1948	1,500	6,149	204	323	370	4,489	3,647	71	3,443	1,039	34,000	218,000	270	273,505	13,398	1	100	13,499	3	.....
1949	2,188	6,100	292	338	411	5,947	3,791	71	4,314	1,125	33,700	237,700	470	296,447	15,997	2	136	16,135	8	.....
1950	2,800	10,200	292	340	909	8,107	3,700	63	4,897	1,205	32,000	266,200	780	331,493	16,373	24	305	16,702	8	.....
1951	1,200	14,600	650	335	2,036	9,681	3,500	136	4,942	1,502	31,000	285,000	1,092	355,674	16,311	49	587	16,947	7	.....
1952	1,010	17,385	842	413	2,456	12,200	3,367	448	5,062	1,502	29,720	311,400	1,005	386,810	16,478	293	760	17,531	7	.....
Total	20,372	100,106	6,217	5,558	19,805	128,735	56,631	4,138	24,625	282,822	1,318,306	7,159,148	4,553	9,131,016	185,664	520	2,225	188,409	73	1,044

[*] WORLD OIL from private sources. [B] Less than 1,000 barrels. [C] Estimated production [D] Year ended September 30. [E] No more data available. [F] Includes fields in Russian Asia other than Sakhalin. [G] France's earlier production credited to Germany.

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PAD's Foreign Program

Calls for Expanded Activity

By J. E. BRANTLY, Assistant Deputy Administrator
Foreign Petroleum Operations, PAD

HIGH POINT in a year of Petroleum Administration for Defense activity in the field of foreign petroleum was reached in a very quiet event. On July 2, 1952, Secretary of the Interior Oscar L. Chapman terminated Plan of Action No. 1, designed to help overcome the shortages caused by the Iranian shutdown.

It was not the termination itself that was so important, but what it signified. For the ending of the plan stood as token of success in the spectacular industry-Government effort to assure a balance in free-world petroleum supply and demand despite the loss of Iran's 160,000 barrels a day of crude and 450,000 barrels a day of products for the world markets.

There were many elements that entered into so prompt a recovery from what had seemed a devastating blow at the time the last tanker loaded at Abadan in June of 1951. The United States increased its exports by approximately 175,000 barrels a day. Oil companies abroad greatly stepped up their normal commercial transactions. Both production and refining abroad were brought to record highs. But there can be no doubt that even all of these activities would have been short of what was needed had it not been for Plan of Action No. 1.

Under this plan, 19 American companies with operations abroad were able, at PAD direction, to cooperate in seeing to it that what supplies of petroleum were available got to the places they were needed when they were needed as efficiently as possible. Twenty-five schedules approved and issued by the assistant deputy PAD administrator in charge of foreign petroleum operations covered transactions involving 45,987,000 barrels of crude and products—19,429,000 barrels of crude and 26,558,000 barrels of products.

An effort to relieve products shortages was made through a schedule to increase effective refining capacity abroad. Strains on transportation were eased by insuring the most efficient possible use of the tanker bottoms available in world trade and by delivering crude and products to a refining or consuming area from the nearest practicable source of supply.

Effect of Strikes. Erasure of the worst of the Iranian-caused shortages during the year was particularly surprising in view of the dislocations the United States' steel strikes imposed during the last half of the year.

These dislocations showed particularly in a drag on drilling in the foreign nations, Canada included. As a result of the strike, for instance, we did not authorize purchase of a single ton of U. S.-produced casing or tubing by any foreign operator during the fourth quarter of 1952. In the preceding quarter purchase of 40,675 tons of carbon-steel and 8625 tons of alloy-steel oil-country tubular goods had been authorized.

It is true that in spite of the shortages the foreign operators came close to realizing their normally expanding drilling programs. PAD in late 1951 had estimated that some 5443 wells would be drilled abroad, given just normal expansion. Actually, it appears that approximately 5168 wells were drilled. This was, however, appreciably below the defense expansion goal that the agency had hoped to see realized. PAD had set, and the Defense Production Administration in April had approved, an expansion goal that called for the drilling of 3376 wells abroad during the last half of the year. The industry drilled some 2755 wells during the half, only 81 percent of the desired goal.

Production fortunately held up in spite of the lag in drilling, thanks largely to the fact that the Middle East's wells continued almost fabulously prolific. Total production from the free-world nations outside the U. S. averaged about 5 million barrels

About the Author

J. E. BRANTLY, assistant deputy administrator, Foreign Petroleum Operations, Petroleum Administration for Defense, was born in Macon, Ga., in 1892. Educated at the University of Alabama and Colorado School of Mines, he holds B.S. and E.M. degrees. Brantly has been a geology instructor at the University of Alabama, assistant state geologist for Georgia, U. S. Army consulting geologist during World War I, and chief geologist for the Atlantic Refining Company. In 1929, he organized Drilling and Exploration Company. In 1952, he was appointed to his present position.

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a day, up better than 8 percent above the 1951 figures, even though Iran had been contributing to the flow for the first half of 1951. In the Middle East alone production averaged 2.1 million barrels a day even though Iran was shut in; in 1951, during half of which Iran produced more than 650,000 barrels daily, production had averaged only 1,928,000 barrels a day.

Fortunately, too, construction of new refining capacity abroad proceeded, not just at the defense-expansion rate PAD had hoped for, but even faster. PAD had set the goal for construction of additional capacity at a rate of 369,000 barrels per day a year. Actually, the industry abroad has been adding to capacity at a rate of 400,000 barrels per day a year. It now is estimated that the free-world refining capacity outside the U. S., which stood at just about 5 million barrels a day at the end of 1951, will be at least 5.8 million barrels a day by the end of 1953, including Abadan in Iran.

Specialized facilities also are being expanded rapidly. It is expected that the free-world capacity for catalytic cracking, which was only 200,000 barrels a day at the end of 1951, will be 500,000 barrels a day by the end of 1953. There was no catalytic reforming capacity abroad at all at the end of 1951; by the end of 1953, it is expected, 15,000 barrels a day capacity will be in operation. Thermal-cracking capacity is expected to be 900,000 barrels a day by the end of 1953, up 30,000 barrels a day from the end of 1951, and thermal-reforming capacity is expected to be 400,000 barrels a day, up 50,000 barrels a day. Lubricating-oil capacity is expected to be 75,000 barrels a day by the end of 1953 as against 57,000 barrels a day at the end of 1951.

Consistently, within the limits of the U. S. manufacturers to produce for overall needs, every effort has been made to sustain this sort of expansion abroad through allocation of critical materials. Thus, in the third quarter of 1952 foreign refiners were authorized to make purchases of 27,256 tons of carbon-steel items, 1734 tons of alloy-steel items and 388,000 pounds of stainless-steel items. For the fourth quarter of the year the figures were: carbon steel, 32,680 tons; alloy steel, 754 tons, and stainless steel, 339,050 pounds. (These figures do not include Canadian authorizations, since those authorizations are handled by the Canadian authorities themselves.)

1953 Plans. Officially PAD's 1953 plans for the petroleum industry abroad are those approved by DPA in April, except that it is recognized now that the refining expansion probably will continue at accelerated rates. Those plans call for:

- The drilling of 6752 wells, or 30.6 million feet of hole.
- The building of 384,000 barrels a day of new refining capacity.
- The building of 22,620,000 barrels capacity of additional storage.
- The laying of 2280 miles of pipe line.

Realistically, though, PAD has been forced to recognize that the limited amount of oil-country tubular goods available in this nation will almost certainly impose limits on the drilling program. Those limits, in turn, will be reflected in a slowing of the construction of new storage and new pipe lines, although refining construction probably will not be seriously affected.

Drilling in Germany, France, Holland and Italy will not be affected at all, of course, by oil-country tubular goods shortages in this country. These nations depend on Western Europe for almost all of their requirements. In large part this is true of the Middle and Far East as well, although drillers there are dependent on American manufacturers for most of their alloy casing and drill pipe.

But it is chiefly in the Western Hemisphere that the U. S. lag in production of casing and tubing is likely to be most serious. And it is in the Western Hemisphere that it was hoped, for obvious defense reasons, to see the greatest expansion of drilling.

In all likelihood, operators in the Western Hemisphere outside the U. S. will continue during 1953 to get only from 60 to 80 percent of the oil-country tubular goods for which they ask from the U. S.

Canadian operators, for instance, would like to drill 3000 or more wells during 1953. We have been forced to program them at 2680 wells, and the likelihood is great that only about 85 percent of that number can actually be completed with the casing and tubing available. Chilean operators asked for a first-quarter 1953 allocation of 1600 tons of tubular goods; they could be given only 600 tons. Peruvian operators would like to drill some 350 wells during the year, but it is doubtful that they will be able to get pipe for more than 260, if that many. Operators in Brazil stand ready to drill some 200 or even 300 wells a year at present; they have had to be programmed for only 71 wells in 1953 because of the shortages of pipe. Operators in Venezuela and Colombia can be given only about 70 percent of the casing and tubing for which they ask.

Supply Situation. In spite of the lack of pipe, the overall free-world supply situation seems reasonably favorable. Production of crude, especially from the Middle East, Venezuela, and the U. S., should meet the requirements. Refining capacity should be sufficient to meet total free-world needs without too great a strain. Beyond all doubt, aviation gasoline will continue to be in tight supply; the free world still has not completely made up the loss of 18,000 barrels a day production from Abadan. Only a few months ago it seemed likely that there would be a tight situation on residual, but now the problem seems rather to be one of finding markets for the available supply. Threatened distillate shortages have disappeared, and supply seems comfortably adequate for demand in the immediately foreseeable future.

Obviously, little can be done in the way of building a reserve of capacity that would be needed in the event of war. So long as the shortage of oil-country tubular goods continues, that will be a realistic condition that must be faced in all free-world international planning.

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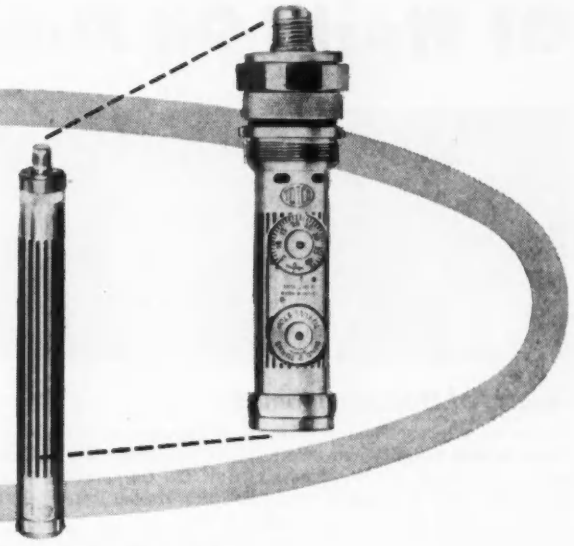

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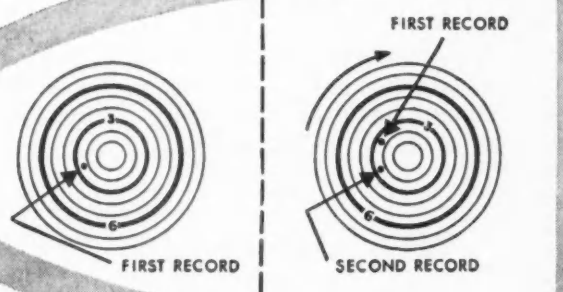

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Of World Oil Men

Guests of Houston Nomads

Guests at a recent Houston chapter of Nomads meeting included, left to right, Guy Woodruff, Mene Grande Oil Company, Barcelona, Venezuela; W. O. Calvert, manufacturing representative, London, England; H. W. Kendrick, Gulf Oil Corporation, Houston; S. M. Sims, Iraq Petroleum Company, London, England; O. B. Irizarry, Petroleo Interamericano, Tulsa, Okla.; and E. J. Huber, Shell-Condor, Baranquilla, Colombia.

G. W. CRICKMAY has been appointed resident manager of Atlantic Refining Company operations in Venezuela, with headquarters at Caracas. Crickmay joined Atlantic in 1946 as senior field geologist for the Venezuelan operations of the foreign crude oil production department. In 1949 he became geological coordinator, and in 1952 was appointed assistant resident manager at Caracas.

Born at Vancouver, B. C., Canada, Crickmay attended the University of British Columbia, later receiving his Ph.D. degree at Yale. From 1942 to 1946, he served in the U. S. Navy. He is a member of the New York Academy of Science, the Geological Society of America and the American Association of Petroleum Geologists.

•

HARTLEY C. JACKSON, active in the drilling industry in Alberta for the past six years, has accepted the position of supervisor for the Petroleum Industry Service, Department of Extension of the University of Alberta. Jackson, a native Albertan, is a graduate of the Calgary Normal School, was a teacher and principal for ten years, then attended University of Alberta from which he was graduated in 1946.

•

T. J. DONOVAN, assistant to the president of Sinclair Somal Corporation, a subsidiary of Sinclair Oil Corporation, has been named head of Sinclair Somal's Mogadiscio, Italian Somaliland, office.

E. P. (EV) HAYES, whose appointment as chief petroleum engineer of the producing division of California Texas Oil Company, Ltd., was announced last month has taken up his duties in New York and has ahead of him a considerable amount of traveling. In his new position, his first task is organizing an engineering department for the company's producing division.

E. P. Hayes

For many years Hayes has made his home in Houston, where he was chief petroleum engineer for The Texas Company. Graduating from the Case School of Applied Science with a degree in mechanical engineering in 1915, Hayes first entered the petroleum industry in Bartlesville, Okla. After service in an aviation unit in World War I, he became assistant engineer in charge of a helium plant for the Bureau of Mines at Fort Worth. He later went into the bureau's potash division drilling exploration core holes in West Texas, New Mexico and Utah, and served in the bureau's petroleum division at Bartlesville and Dallas.

Hayes became associated with The Texas Company as petroleum engineer in the South Texas division in 1933. He became division engineer in 1937 and in 1946 was made chief petroleum engineer of the producing department. In 1950 Hayes represented the oil industry as a guest member of the WORLD OIL editorial conference.

Hayes will leave New York this month on a world tour of company installations which will take him to Sumatra, Bahrain Island and elsewhere.

•

SIR ROBERT WATSON-WATT, noted British radar scientist, has been elected president and director of the New Continental Oil Company of Canada, Ltd., succeeding FRANK KAFTEL, resigned. Sir Robert, who has received major citations for his collaboration with research groups and who received the Medal of Merit from President Truman after World War II, is also a member of the board of Canadian Aviation Electronics. Before accepting the presidency of New Continental, he resigned as a director of Odeon Theatres, Ltd., the principal operating company of the J. Arthur Rank motion picture enterprises.

•

DAVID GIRSHAN, who has been with Burmah Oil Company (Pakistan Concessions, Limited,) for the past 26 years is visiting relatives in Chicago, Illinois, and Kingsville, Texas, and is studying modern drilling techniques used in the U. S. Girshan has been in charge of his company's two recent test wells.

He arrived at New York January 3, and will leave there March 6 for Great Britain and Pakistan.

•

FERNANDO PADILLA, New York representative of Petroleos Mexicanos, has been appointed assistant managing director of the government-owned company by the President of Mexico.

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JOHN W. MOYER has been elected president and managing director of Home Oil Company, Calgary, Alberta, succeeding ROBERT CURRAN, resigned. Alex Clark, Casper, Wyo., has been appointed director and vice president of the company.

•

C. STRIBLING SNODGRASS, senior vice president, Bechtel Corporation, has left his direct operating responsibilities in Bechtel Corporation and its affiliates to re-enter the consulting field. He will continue as an advisor and associate of Bechtel.

As vice president of International Bechtel, Inc., Snodgrass was active

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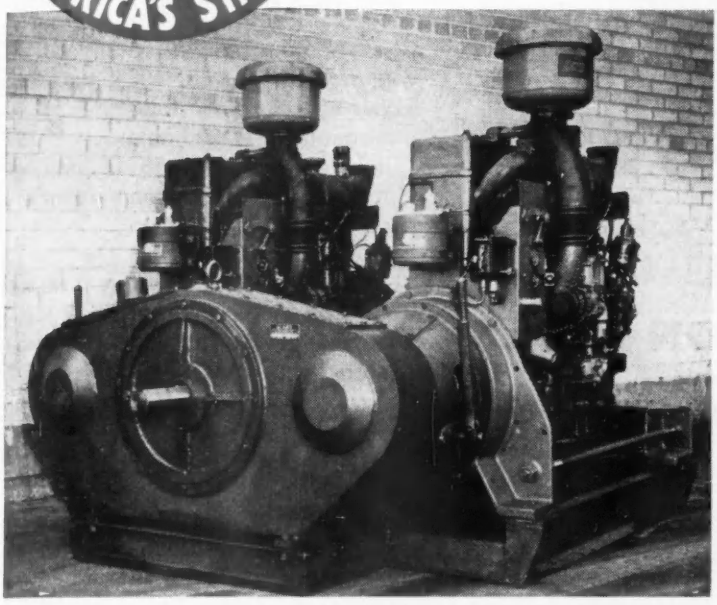
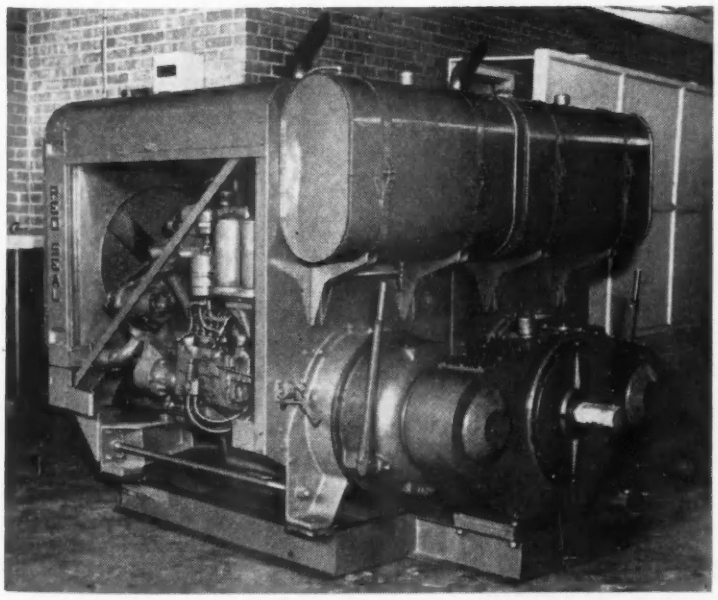


Continental 33R's as compounded for oil field use. Dual unit delivers all but approximately 2% of the full output of its two component engines.



Continental RD-572 Diesel closed power unit, compounded version. Other Red Seal models adapted to compounding include the 427, 501 and 602 Series.

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on projects in the Middle East, including modernization of the city and harbor of Jidda. His experience, particularly on foreign oil matters, is one of the most extensive in the industry. During the war he served as a key official of Petroleum Administration for War, occupying the posts of Foreign Refining Division director and Foreign Operating Committee chairman.

Early in 1951, he returned to Washington on special assignment as the assistant deputy administrator of Petroleum Administration for Defense in charge of foreign petroleum operations.

In his present capacity as associate and consultant, Snodgrass will have headquarters in the Bechtel Corporation office at Washington, D. C.

•

H. A. JARVIS has been elected a director and L. E. LOWRY has been appointed comptroller of Creole Petroleum Corporation, following the resignation of I. R. CUNNINGHAM, former director and comptroller, who has accepted a position with Standard Oil Company (New Jersey).

Jarvis, manager of the Western Division of Creole at Maracaibo, Venezuela, has been associated with Creole and other Standard Oil affiliates in Argentina and Venezuela since June, 1930. He is a graduate of the University of Maryland, where he majored in mechanical engineering.

Lowry, assistant comptroller, joined The Carter Oil Company, a Jersey Standard affiliate, in Tulsa, Okla., in June, 1937. He went to Venezuela as an accountant with Standard of Venezuela in March, 1938, and has remained there since that time. He is a graduate of Oklahoma A. & M. College with a BS degree in business administration and commercial accounting.

•

J. K. SWANSON, assistant director of mineral resources in the Department of Natural Resources, Government of Saskatchewan, has resigned to reenter private business. Swanson, a veteran oil man, has been with the department since April, 1949, when he was appointed supervisor of natural gas development.

He went to the department with more than 30 years of experience in the oil and gas industry. A native of Caithness County, Scotland, and a graduate of Albion College, Michigan, he began in the oil and gas business with Commonwealth and Southern utility companies in Michigan. He was manager of Franco Oils, Ltd., in Saskatoon for ten years before joining the department.

•

W. B. AIRTH, general manager of Ajax Petroleums Limited since the company was formed, recently was elected president. He will continue his duties as general manager of the company, as well as his dual duties as president and general manager of Ajax Alberta Pipeline Limited, a wholly-owned subsidiary of the company.

Airth replaces J. B. ADOUE, who resigned as president of Ajax Petroleums. Adoue will remain as a director.

Airth has supervised exploration of Ajax's gas field at Morinville, Alberta, and also construction of the 42-mile gas-gathering and transmission pipe line to the plant of the Canadian Chemical Company Limited, subsidiary of the Celanese Corporation of America at East Edmonton.

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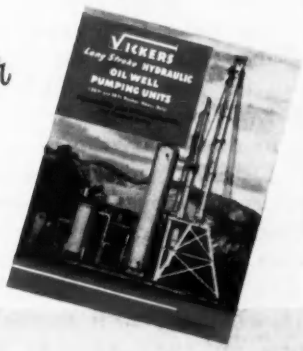

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Accessibility of prairie locations, particularly on remote wildcats, may not be trouble-free, since rains may make roads impassable and spring thaws can shut down operations completely. Here a derrick is being raised on new location in Bonnie Glenn area of central Alberta where the terrain is fairly flat.

Terrain and weather conditions are two factors which contribute greatly to the cost of drilling a well in Western Canada. Shown here is a typical drilling operation in the Fort St. John area of British Columbia, an important new gas producing area in western part of Peace River District.

Efficiency Curbs Canadian Drilling Costs

Penetration rates have offset cost spiral. Continued study of rising expenses needed to plot future course.

By RALPH L. BINNING, Executive Vice President,
and **B. H. COREY,** Production Manager,
General Petroleums of Canada, Ltd., Calgary

THE SUCCESS ATTAINED in the development of crude reserves in Western Canada has made the oil industry one of the major basic industries of Canada. These large reserves have been found and developed as the result of drilling favorable areas. Exploratory and development drilling is continuing at a rapid pace, and the number of drilling rigs in Western Canada is at an all time high. If trends continue, each month should witness an even greater number. Shortages of labor and materials, however, will tend to retard growth.

Costs of most things have advanced materially during the past ten years and particularly since 1945. Drilling contractors are aware of these increases in costs and more accurate records of trends are being maintained. There are several instances where drilling contractors, through their associations and special committees, have undertaken careful studies to accurately record cost trends. The results of these efforts are a matter of record. Governmental bureaus also have completed valuable studies.

Well costs may include several factors such as the acquisition of mineral rights, costs of exploration, drilling costs and production costs. The leasing of mineral rights or "land" prior to the exploration studies or the drilling of a well may be reasonable or expensive. Prices may range from a few cents per acre to many thousands of dollars per

...sedimentary formation???

Not too many years ago the term "sedimentary formation" meant little in the lives of those rugged men who were penetrating the earth's crust in search of oil. Demand, the great factor in economic evolution, commanded oil companies and their service and supply companies to create scientific task forces to investigate sedimentary formations and to develop equipment that would permit penetration to great depths. Today, the anticipation of recovery problems by manufacturing, service or supply companies has become as important as the sale of a product. Vast sums are expended annually in research and development to make an ever greater petroleum industry.

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Road costs, even in prairie land of Alberta, can represent a relatively high percentage of well costs. Here is a typical road cut through wooded area in the Bonnie Glen-Pigeon Lake region southwest of Edmonton.

acre as in some of the Crown Reserve sales in Alberta.

Exploration costs may also vary, depending on the thoroughness of the study, and whether geophysics or other special services may be employed. Differences in drilling costs cover a wide scope and may be dependent on location, terrain, weather, depths, formations to be penetrated and so on. Production costs are more stable but may also vary depending on local conditions, size of operation and oil and gas treating problems. This discussion will deal primarily with the trends of costs in drilling wells and for the most part with conditions in Western Canada, though reference may be made to certain industry-wide studies.

Conditions Vary. Drilling conditions vary widely in Western Canada. Rigs have been developed to meet these different conditions. The rotary drilling rig is used almost exclusively. Small mobile units have been developed for the shallow drilling typified by the black oil development at Lloydminster; medium-sized highly portable units, adapted particularly for prairie work, are used from Manitoba to Leduc and Redwater and into the muskeg areas; and the larger units are used on the deep drilling operations of the Foothills areas, such as Pincher Creek, Jumping Pound and Peace River.

Terrain and weather are two factors which contribute to differences in drilling costs in Western Canada. It is obvious that costs could differ to a great extent if comparisons were made between wells drilled in mountainous country, plains, woodland or muskeg areas. Each area would have its own particular cost range. Indeed, one of the most costly wells in Western Canada was drilled by five major companies on the Muskeg Anticline in the northern foothills of Alberta. Total cost of the well is recorded at $1½ million, and included in this amount is the sum of $500,000 for the 70-mile road to the location. In other words, the road cost equalled one-half of the actual drilling cost of the well.

On the prairies, even though the wells may be located in remote areas, road costs would be minor in comparison. Due to the nature of muskeg country, it has been found that the only practical time to drill is when the ground is frozen. This results in higher drilling costs since double the number of rigs must be employed to complete a program which might be carried on throughout the entire year on the prairies. It is not intended, however, to impart the thought that conditions on the prairies may be trouble-free since rains may make roads impassable and spring thaws completely shut down operations.

The wide range of temperatures encountered in Western Canada—from lows of 60 degrees below to highs of 100 degrees—affects drilling costs. Winterization of a rig adds to the cost and the costs include auxiliary boiler, blowers, fuel, extra crews, special lubricants and prefab protection. Additional items relating to the foregoing are also necessary. It is estimated that winter conditions add approximately 20 percent to the overall drilling and well cost. Some contractors have partially met their portion of higher winter costs by increasing manpower to speed rig moves.

The above has been a sketchy outline of some of the basic factors affecting drilling costs in Western Canada. The following is presented to show the trends in drilling costs over the past few years and will include labor costs, equipment costs, maintenance costs, depreciation costs and miscellaneous costs.

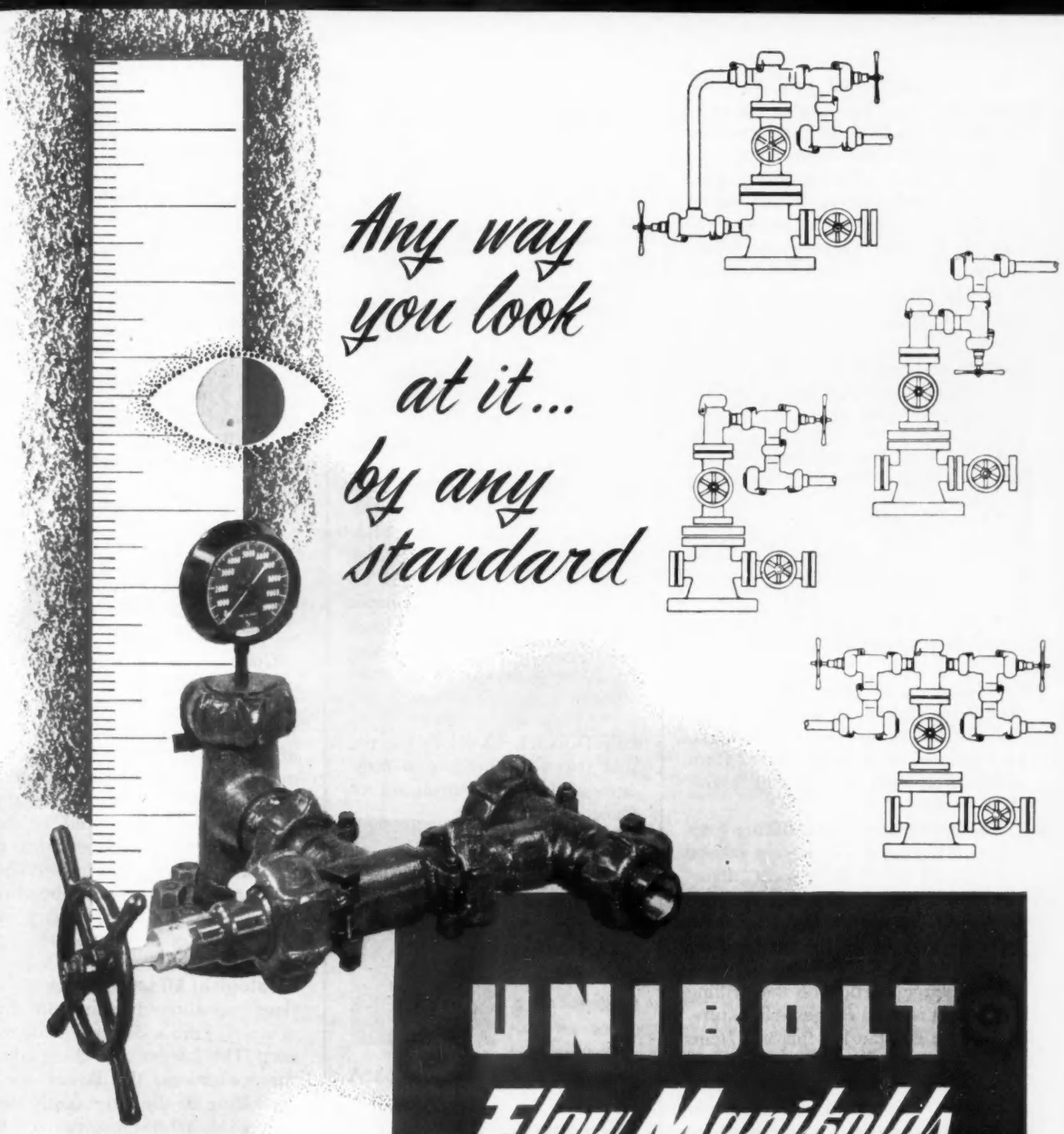
Penetration rates will show increases and this, coupled with greater efficiencies, has resulted in the fact that, notwithstanding the many cost increases, the drilling contractor has maintained or even decreased footage rates compared with 1945 levels.

The following data (see Table 1), obtained after careful study by the Canadian Association of Oilwell Drilling Contractors, will stress the significance of the achievement by the drilling contracting branch of the oil industry in better than holding the line on actual drilling revenue obtained through increased penetration rates.

This was made possible by the improvement in design and quality of drilling bits, better engineered drilling equipment and increased knowledge of drilling fluids and of geological

TABLE 1

	1941	1945	1947	1948	1949	1950	1951	1952
Revenue per foot drilled	100%	115%	110%	105%	101%	100%	100%	100%
Rate of penetration	100%	105%	115%	120%	125%	135%	150%	175%



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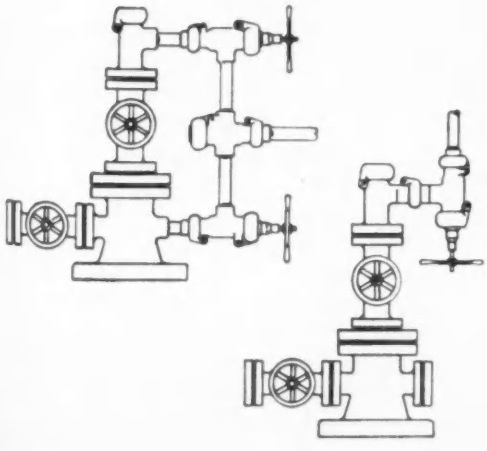

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formations. Improved drilling technique, developed through never ending research by both the producer and the contractor, has contributed materially to the increase in penetration rates. Of particular significance contributing to increases in penetration rates in Western Canada operations has been the transition from foothills to plains drilling during the period 1941 to 1952.

Factors in Cost Rise. Major factors in the trend toward increased drilling costs are:

- Higher costs of wages, equipment and operating expenses.
- Greater depth of wells.
- The larger proportion of wildcat wells being drilled.
- Larger number of marginal wells drilled in developed fields.

Labor costs, which represent 30 percent to 40 percent of the expense of drilling a well in Western Canada, have risen more than 50 percent from 1945 levels and 95 percent above 1941 levels.

Equipment and direct drilling costs today are nearly 70 percent above 1945 levels and 80 percent above 1941 levels. This is an important item to the drilling contractor since these expenses may be of the order of 50 percent of all drilling expenditures. Since a large portion of the drilling equipment is of an expendable nature, it must be constantly replaced. Items which represent heavy expense would include bits, drill pipe, drill collars, wire lines, chains, mud, and chemicals.

Miscellaneous expenses have increased in much the same proportion to equipment costs and are probably about 80 percent above 1941 levels. This group of expenses includes greater moving costs, more complete insurance coverage, camp maintenance, communications, and the many services incidental to oil well drilling.

The deeper the well the more costly becomes the rate per foot. For comparison, a 10,000-foot well would cost about 2½ times as much as a 7000-foot well, and a 14,000-foot well nearly six times as much as the 7000-foot well. Below 7000 feet, making hole becomes progressively slower and time is required for non-hole making operations such as round trips with drilling string, surveys, circulating and precautions taken when drilling at depth.

There is an indicated trend in the industry toward more wildcat wells being drilled which, in turn, is reflected in increased drilling costs. Wildcat wells cost more than field wells. Higher cost may result from an increased amount of coring and survey work, slower penetration rates when drilling in unknown geological formations, and the possible remoteness of supply centers. Moving, camp, and communication costs represent higher miscellaneous expense for wildcat locations.

The main development in the Leduc and Redwater fields of Alberta has passed. From now on an increasing number of marginal type wells will be drilled. Drilling cost will probably increase due to the extra precautions necessitating additional coring and testing, and so on.

A comparison of drilling costs of a typical well in the Leduc-Woodbend field as compared with a wildcat well in the general Edmonton area is shown in Table 2.

Costs at wildcat wells located more remotely from established oil fields would disclose the fact that labor would represent a smaller percentage of the total cost, and repairs and maintenance, overhead and miscellaneous expenses would be proportionately higher. This would be largely due to the slower penetration rates, the more expensive down times for repairs and the expenses involved in the special services necessary at remote points of development.

Geological Effect. Geological formations encountered during the drilling of a well have a direct bearing on the cost. The harder and more abrasive the formations, the slower the rate of drilling or the more costly the bits become to achieve maximum rates of penetration. Where formations become particularly hard, it is frequently necessary to try several types of bits to obtain the one most suitable for the job. Bit costs may be an important item in the drilling of a well as shown by the following comparisons: Muskeg No. 1 bit costs averaged $8.59 per foot; Edmonton area bit costs are $1 per foot; Camrose area 30 cents per foot, and Lloydminster area less than 10 cents per foot.

As has been shown for the period 1941 to date, the actual revenue to the drilling contractor per foot of hole drilled has been held comparatively constant by his ability to continually increase the rate of penetration. This condition is applicable to wells drilled

About the Authors

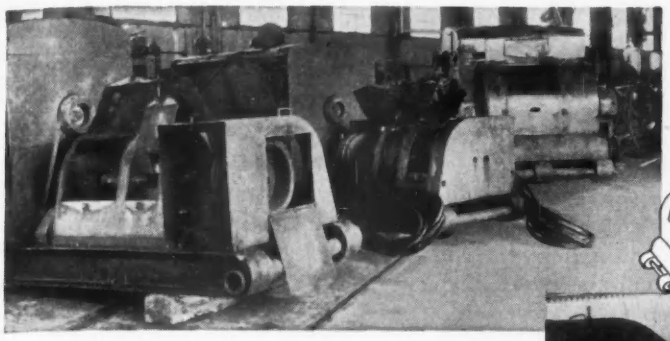
RALPH L. BINNING is executive vice-president of General Petroleums of Canada Limited. He has been associated with this company since 1948. He began work in the production branch of the oil industry in 1923 and transferred to the rotary drilling branch in 1931. He has been active, since then, in both the Rocky Mountain and Mid-Continent areas of the U. S. and in Western Canada. In 1928 he attended University of Oklahoma for one year; then attended Iowa State College for two years where he majored in chemical technology.

BERTON H. COREY, for the past two years production manager of General Petroleums of Canada Limited, attended University of Alberta and in 1939 was graduated with a B.S. degree in mining engineering. Prior to joining General Petroleums of Canada Limited, he was field engineer for The Petroleum and Natural Gas Conservation Board, and petroleum engineer for Canadian Pacific Railway Company.

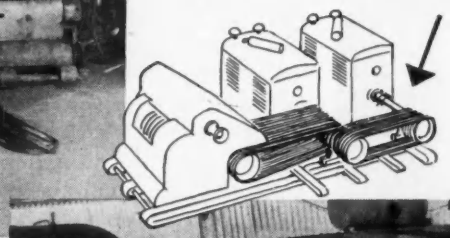
Table 2

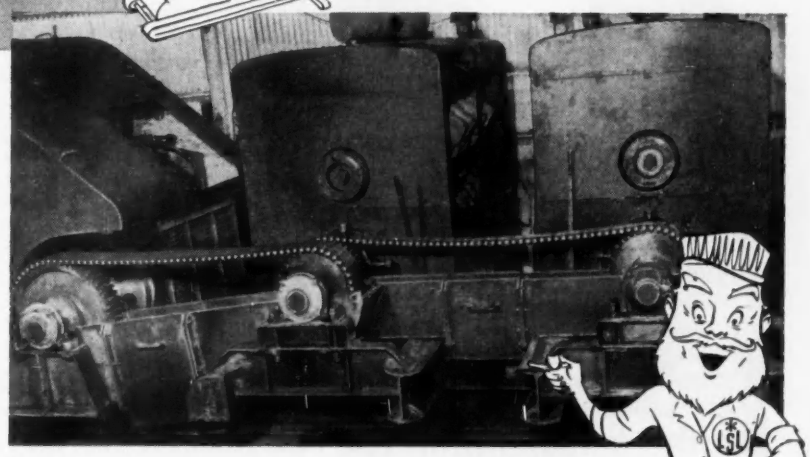
	Leduc-Woodbend Field Well	Edmonton Area Wildcat
Labor	38%	32%
Repairs and Maintenance	18%	20%
Depreciation	10%	10%
Overhead	11%	12%
Miscellaneous	23%	26%

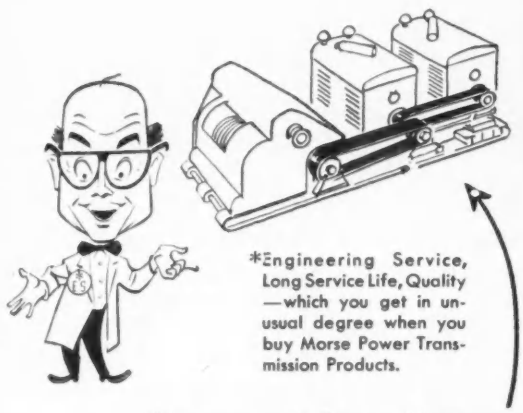
Reduce moving day costs!



1. This rig with compound Diesel engine and drawworks had to be built in three parts because of huge bulk of V-belt drives. Assembly, disassembly and "trueing up" wasted time, money. Also, drive tension needed when drilling below 8000 feet caused bearing failures seven times in one year.







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2. Here is the same drawworks converted to HY-VO Drive. A slim 1½" pitch x 3" wide HY-VO Chain compounds the 175 hp Diesels, and 1½" pitch x 6" wide HY-VO Chain drives the drawworks at 900 rpm and 3600 fpm. Compact, lightweight HY-VO saved so much bulk that the drawworks could be built as a single unit, easily hauled on one truck. Too, extra capacity of HY-VO allows deep drilling *with no undue strain* on bearings.

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in proven fields where the contractor is familiar with all conditions to be encountered and the operator has sufficient information which, in turn, requires only a minimum amount of coring and testing.

Exploratory, or wildcat, wells which are drilled in unexplored and unproven areas are in a different category cost-wise than the development wells in a proven field. Most wildcat wells are drilled on a day-work basis from top to bottom, which means the operator pays the contractor a set fee per day for his drilling equipment and crews. Other wildcat wells are drilled on a footage basis, but by virtue of their exploratory nature, requiring much coring, rat-holing and testing, rates are compensatingly higher. The cost of drilling is at a new peak (see Table 3).

In early March, 1948, the average footage rates in the Leduc Field were: D-3 wells, 5400 feet—$8.75 per foot; D-2 wells, 5100 feet—$8.25 per foot. Today's footage rate for D-3 wells is $7 per foot, a reduction of $1.75 per foot; and for D-2 wells, $6.50 per foot, also a reduction of $1.75 per foot. Increased penetration rates, together with more efficient drilling operations as a whole, have made this reduction possible in spite of the increased operating costs as indicated by the above data. These data also indicate the increased operational costs which have been offset by gradual increase of day-work rates for drilling equipment.

For an example of the increased day-work rates, one of the major operators in the Leduc Field was paying early in 1948 at the rate of $25 per hour with drill pipe in use, and $20 per hour with drill pipe not in use.

The rates have been gradually increased since that time and today are $37 per hour with drill pipe in use, and $32 per hour with drill pipe not in use, which amounts to an increase of $12 per hour in both instances. Rates for drilling rigs suitable for either shallower or deeper drilling than the Leduc type rig have increased in comparatively the same ratio.

Penetration Rates. From the foregoing it is apparent that drilling costs, including labor, equipment and miscellaneous expenses, have been rising over the past ten years or so, but during this same period penetration rates have also increased. This has resulted in drilling contractors maintaining or even decreasing footage rates in many areas. If trends continue, it is reasonable to assume these costs will continue to increase, but to partially offset this, the penetration rates may possibly be increased.

Careful cost analyses are necessary to plot trends accurately. Continuing research by metallurgists and others are necessary if equipment is to be improved to keep pace with mounting drilling costs. Field studies also are necessary in the proper use of equipment, muds and chemicals, all toward the goal of increasing penetration rates. Recent tests made with jet bits have shown that penetration rates might be increased. These tests are continuing, and it is considered likely that important strides may be expected in this phase of drilling operations. Certainly, jet bits have their application in drilling and, in some instances, have proved superior to the normal type rock bits.

This paper has been prepared for the purpose of analyzing some of the trends in drilling costs and some of the problems. It is believed that it may be worthwhile to draw these matters to the attention of other branches of the oil industry and that better understanding may result. It is hoped perhaps this paper may stimulate a more detailed research in the subject of drilling costs.

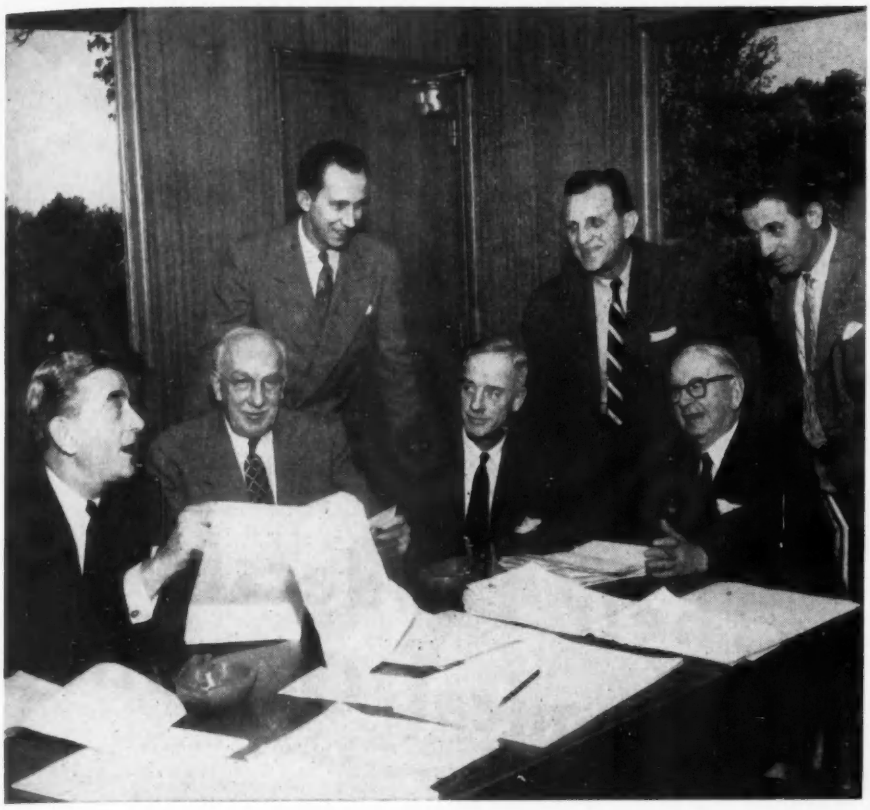
ACKNOWLEDGMENT

This paper presented at Annual Western Meeting of Canadian Institute of Mining and Metallurgy, Petroleum and Natural Gas Division, Winnipeg, October 15-17, 1952.

TABLE 3

Trends in Drilling Costs (recent years compared with 1941)

	1941	1945	1947	1948	1949	1950	1951	1952
Labor	100%	140%	150%	170%	189%	190%	192%	195%
Equipment	100%	110%	132%	145%	160%	175%	178%	180%
Miscellaneous	100%	120%	160%	165%	170%	175%	178%	180%
Total Costs	100%	122%	145%	160%	170%	180%	182%	185%



They're talking about housing. Here IPE Housing Bureau officials gather with Tulsa hotel executives to discuss room reservations for the May 14-23 International Petroleum Exposition in Tulsa. Left to right seated are Frank Bently, Mayo Hotel; Barton A. Myers, A. F. Keating and W. L. Connelly, bureau committeemen; standing, John Marshall, head of Tulsa Chamber of Commerce conventions department; Hollis Hodges and Robert Taylor of Hotel Tulsa. Individual meetings are being held with other hotel executives.

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By BARTON A. MYERS
Chairman, Housing Bureau,
International Petroleum Exposition, Tulsa, Oklahoma

THANKS TO HOSPITABLE Tulsans and the cooperation of Tulsa hotels, not to mention the hard work of the housing bureau of the International Petroleum Exposition, an estimated 25,000 visitors from all over the world expected for oildom's "$100 million show" to be held May 14-23 in Tulsa, Okla., will have no trouble in finding accommodations. And this, regardless of whether the visitor wants to stay one day or throughout the entire ten-day period.

Finding "bed and board" for so many visitors was no easy matter. And some visitors may not obtain the sort of accommodations "to which they are accustomed." But all who apply will be taken care of and will be quite comfortable.

The estimate of 25,000 visitors expected to attend the International Petroleum Exposition in Tulsa next May was made by General Manager Wm. B. Way and is based on an independent survey made at the last show for certain exhibitors by Leslie Brooks and Associates, oil field research consultants, which shows that 15,508 oil men of buyer and specifier capacity from 43 nations and 29 states attended the last Exposition held in Tulsa in 1948. No survey was made of exhibitors but Way estimated them conservatively at over 5000.

Due to the increased size of this year's show, and increased attendance of oil men at oil gatherings the past few years, Way estimates the 1953 attendance will be from 15 to 25 percent above that of the 1948 show. Attendance from foreign countries should double, according to advanced indications received at the Exposition office, the office of Exposition President W. G. Skelly and the office of Governor Johnston Murray of Oklahoma who toured Latin-America in behalf of the Exposition last summer.

To coordinate the work of housing this "largest gathering of oil and supply men" IPE officials formed a Housing Bureau consisting of Barton A. Myers, chairman, and W. L. Connelly, Sinclair Oil and Gas Company, and Anthony F. Keating, Keating Drilling Company.

Last spring the Tulsa Hotel Association met with Exposition officials and pledged its full cooperation, allowing the IPE Housing Bureau to allocate all rooms. Tulsa hotels and merchants wrote letters warning merchandising and non-oil traveling men to stay away from Tulsa during the show. As a result the Housing Bureau has nearly 100 percent of all Tulsa hotel rooms available for the visitors.

Next, Tulsa citizens were asked, as a civic matter, to make their homes available. They were asked to double up with friends, or if non-oil people, to take vacations.

After a three-month campaign through every news media in Tulsa, some 1500 homes, many of the fine suburban home variety, were listed with the IPE Housing Bureau.

The homes range from two bedrooms to one home with 16 baths. Rental prices range from $5 to $12 per day per person in over 90 percent of the homes listed.

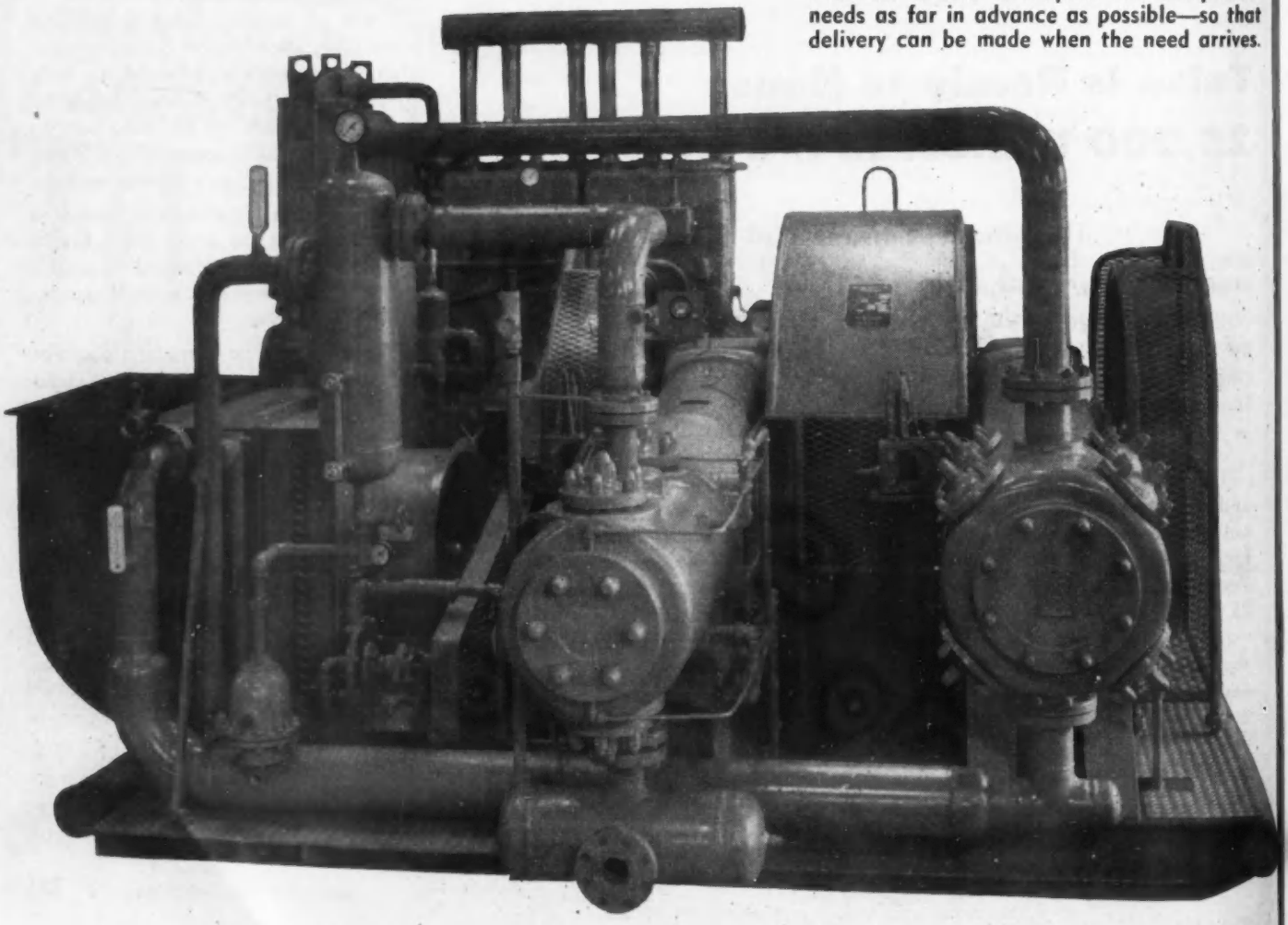
One feature of the homes deal which is proving popular is an insurance indemnity bond to protect both company and home owner in case of damage.

This is not the first time private homes have been used. There were many rented for the 1948 show and

85 H.P. 150 H.P. 500 H.P.

Engineered to Meet Specific Needs... Wilson Supply — Ingersoll - Rand *"Packaged"* Portable Compressors Have Proven Their Leadership in Dependable, Economical Operation.

While Wilson Supply Company has many sizes of Compressors in stock or on order—varying field conditions and requirements make it impossible to carry all sizes of compressor cylinders and engines. Therefore the Producer should anticipate his compressor needs as far in advance as possible—so that delivery can be made when the need arrives.



THE COMPRESSOR DIVISION OF WILSON SUPPLY COMPANY *Pioneered* THE "CLOSED GAS LIFT SYSTEM" OF PRODUCING OIL . . .

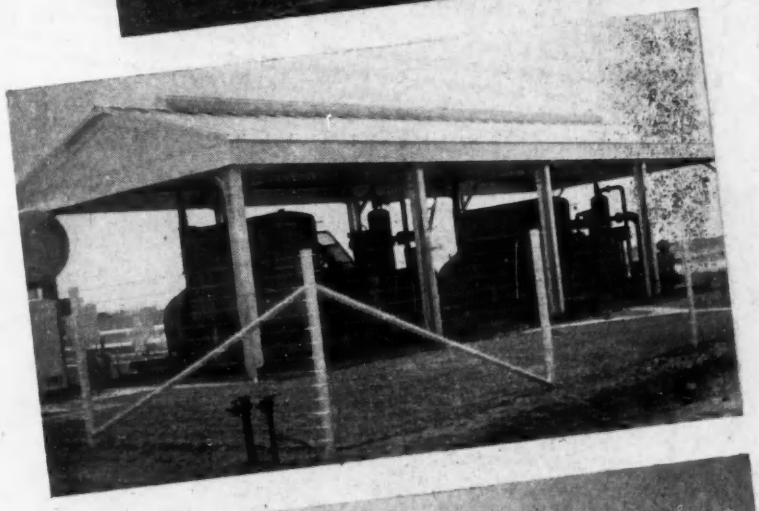
The Field photographs on this page emphasize the adaptability of Wilson Supply—Ingersoll-Rand "Packaged" Portable Compressors in meeting the varying field condition of the producer.

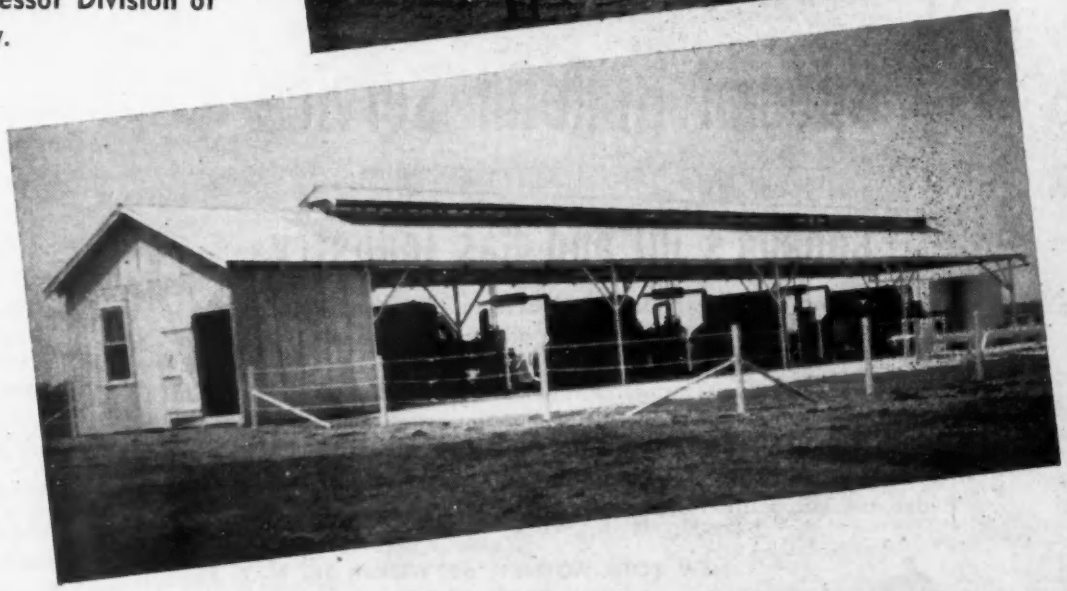
If your requirements for Gas Lifting calls for 85 H.P., 150 H.P., or 500 H.P.—you can get the desired result with an installation of these "Packaged" Portable Compressors.

In event of a change in field conditions, these units may be split and moved to other locations at very nominal expense.

The "Know How" of Wilson Supply Company in fabricating these units means dollars saved to the purchaser in long life and trouble free performance.

Whatever your Compressor needs—consult with the Compressor Division of Wilson Supply Company.





Contact your nearest Wilson Supply Store or write "Compressor Division," Wilson Supply Company, P. O. Drawer 19, Houston, Texas, for detailed information, and quotations. Please give suction and discharge pressure and volume to be handled.

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1301 Conti St. (Corner of Walnut)

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TEXAS: Alice, Corpus Christi, Victoria, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Monahans.
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SHREVEPORT, LA.
NEW ORLEANS, LA.

it has been interesting to the Housing Bureau to note that many oil companies and exhibitors have made arrangements to rent the same homes for this year's show.

Many exhibitors and oil companies prefer private homes to hotels because they have available living rooms, dens, club rooms and kitchens for entertainment.

Besides the approximately 1500 homes, the Housing Bureau has listed some 2000 individual rooms in other Tulsa residences.

Both homes and rooms are being inspected by two woman's organizations as a civic project and conditions of the homes and their rating are card listed and filed with the IPE Housing Bureau.

The utmost impartiality is being employed in allocating hotel space. A secret committee of the IPE Housing Bureau representing oil companies, manufacturers and supply companies, are screening requests for hotel rooms which are in short supply. The Housing Bureau's policy is to allocate at least one headquarters room to companies in one of the hotels.

Of the utmost importance . . .

Those planning to attend the show should get in their requests immediately. Notice of hotel reservations were closed February 15.

Facilities currently available indicate that the Housing Bureau can take care of the following: hotels—5000, homes — 12,000, and rooms — 6000.

According to the Leslie Brooks and Associates survey at the last exposition, out-of-town oil men spent an average of 2.73 days attending the show. Most companies staggered their personnel sent to visit the exposition. With a ten-day show and figuring a three-day stay by the average oil man, the Housing Bureau feels it can easily take care of 23,000 visitors. However, as a hedge against a greater number, arrangements have been made to accommodate up to 30,000 if necessary.

The IPE Housing Bureau, while directed by a lay committee, is supervised by the Conventions Department of the Tulsa Chamber of Commerce.

For More Information

For further information as to housing contact, either personally or in writing:

IPE Housing Bureau
Tulsa Chamber of Commerce
616 South Boston
Tulsa, Okla.

The formula for securing housing during the International Petroleum Exposition is as follows:

- Determine how many men you will send and how many days each man will stay in Tulsa.
- From these two figures the total number of men per day for which accommodations are needed for the ten-day show period.
- Write the bureau at the above address or, better still, send a company local representative if you have one, to obtain a group of listings which can accommodate the specific number of men per day.
- From the listings select the home or homes which satisfy the number needed plus other requirements, such as location and price.

Mail this coupon

Oil & Gas Dept., The Royal Bank of Canada, Calgary, Alta.

Please send me the bulletins I have checked off below.

- ☐ Regulations—Leases & Reservations—Alberta
- ☐ Regulations—Leases & Reservations—Saskatchewan
- ☐ Regulations—Leases & Reservations—British Columbia
- ☐ Regulations—Leases & Reservations—Manitoba
- ☐ Conservation & Proration
- ☐ Western Canada Petroleum Association
- ☐ Structure of Federal & Provincial Govts.
- ☐ Business Operations in Canada
- ☐ Minimum Wages & Holidays with Pay
- ☐ Tariffs & Customs Regulations
- ☐ Royalty Payments to the Crown
- ☐ Natural Gas (Reserves, export policy)
- ☐ Oil Financing—the Bank's role
- ☐ Immigration
- ☐ Taxation
- ☐ Trust Companies' Functions —Royalties explained
- ☐ Industry Statistics
- ☐ Stamp Tax on Cheques

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Position .....
Company .....
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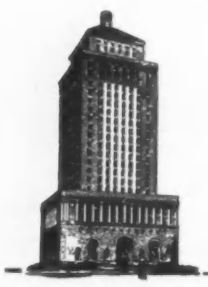
To secure any of these bulletins, together with a handy file folder, use the coupon above.



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TOTAL ASSETS EXCEED $2,675,000,000

HERCULES MOTORS CORPORATION

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Announces the Opening of its

FACTORY SALES AND SERVICE BRANCH

at Oklahoma City, Oklahoma

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December Fifteenth Nineteen Hundred Fifty-Two

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The increased use of Hercules engines and power units throughout the oil fields has resulted in the opening of new sales and service facilities in Oklahoma City. The new branch located at 1117 Exchange Avenue provides ample space for stocks of Hercules Engines and Power Units available for immediate delivery. Other facilities include a modern service department with an adequate stock of parts which is maintained at all times as well as a large, modern, fully equipped machine shop where engines and power units can be economically repaired, overhauled or rebuilt. These new facilities are for the benefit of present and future Hercules users. We hope you will come and look them over . . . and make good use of them when in need of expert Hercules Service.

This new branch is in addition to the five Hercules branches located at Los Angeles, Calif., Salem, Ill., Houston, Odessa and Kilgore, Texas, and is to provide additional facilities for the increased demand of Hercules products. In addition the following Hercules distributors in the mid-continent area maintain adequate stocks of power units and parts for sales and service:

Food Machinery & Chemical Corp.
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Western Supply Co.
El Paso, Texas

Kellet Industries
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Oilfield Motor Service
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Lightbourn Equipment Co.
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Superior Iron Works & Supply Co.
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Gasoline, Natural Gas and Diesel Engines and Power Units

HERCULES MOTORS CORPORATION · Canton 2, Ohio

Engine Specialists Since 1915

News of Men in the Industry

R. R. Dean is now vice president in charge of natural gasoline and products for Tennessee Production Company, an oil and gas exploration and production affiliate of Tennessee Gas Transmission Company. Dean was a principal owner of the Del Rey Petroleum Company, operator and part owner of a natural gasoline plant in Colorado County until the recent acquisition of the plant's assets by Tennessee Gas and Tennessee Production.

R. R. Dean

•

G. R. Couper has been named assistant division manager of the Pacific Coast division in Los Angeles, for The Texas Company's Producing department. Couper is a native of Houston and has been with Texaco for 33 years, having joined the company as a member of The Texas Pipe Line Company, a subsidiary. He was transferred to Los Angeles in 1929 after serving at Wichita Falls for several years. He was named division land and leaseman for the Pacific Coast division in 1941.

•

Robert G. Parker, associated with Continental Oil Company's oil and gas production activities since 1939, has been promoted to production manager for Conoco's central region with headquarters in Oklahoma City. Parker joined Conoco as driller and derrick man at Ventura, Calif., and by 1948 was district petroleum engineer for West Coast production activities. He has held executive production positions at Wichita Falls and in 1952 became assistant production manager of the southwestern region with headquarters in Fort Worth.

•

R. R. Turner has been named field superintendent of Stanolind Oil and Gas Company's Salt Creek area in Wyoming, replacing **W. A. Van Hook, Jr.** Turner formerly was production foreman in the Elk Basin area of Wyoming. He joined Stanolind in 1937 following graduation from South Dakota School of Mines. Van Hook, Jr., was transferred to Shreveport as district superintendent. He joined Stanolind in 1935 as roustabout in the Oklahoma Central division and later served in various engineering capacities throughout the company. He became field superintendent of the Salt Creek area in 1951. He is a graduate of Colorado School of Mines in petroleum engineering.

•

E. B. Swanson recently received a plaque in honor of his long services in petroleum statistics for the Petroleum Administration for War, the Bureau of Mines, the oil and gas division and other agencies of the Interior Department. The plaque was presented by Fred Van Covern, statistical director of the API.

J. W. Foley, assistant to the chairman of the board since 1950, has been elected a vice-president of The Texas Company. Foley joined Texaco in 1932 as a rotary rig helper, and subsequently served with Bahrain Petroleum Company, Ltd., as petroleum engineer. Returning to domestic Texaco operations in 1940, he served as superintendent of Gas-Gasoline operations, assistant to the manager—producing in Houston, assistant division manager of the Oklahoma division in Tulsa, and assistant to the vice president—producing in New York.

•

Ludlow Shonnard, Jr., manager of personnel and claims, was recently elected vice president of Southern Counties Gas Company, Los Angeles. Shonnard holds a general engineering degree from the University of Southern California. He went to work for Southern Counties Gas Company in 1934 immediately following graduation. He will continue to direct personnel and claims activities and will be responsible for industrial relations.

•

George E. Gosnell, formerly with Sunray Oil Corporation, has opened a geological consulting service in San Antonio, Texas. Gosnell reports possession of the geological files of the late Harold G. Picklesimer.

•

James E. Dyer, vice president of Sinclair Oil Corporation, New York, has been appointed chairman of the Jobber Advisory Subcommittee of the Division of Marketing of the American Petroleum Institute. **R. C. Arnold,** general sales manager, Gulf Oil Corporation, Pittsburgh, was the only new member appointed to the Jobber Subcommittee. All other members of the committee were re-appointed for 1953:

Charles H. Arnold, Haggert's Service, Inc., Fargo, N. D.; **E. K. Bennett,** E. K. Bennett Oil Company, Longview, Texas; **Dwight F. Benton,** Standard Oil Company (Ind.), Chicago; **John F. Cummins,** Cumberland Oil Company, Nashville, Tenn.; **Horace E. Davenport,** G. W. Pickering Company, Salem, Mass.; **M. D. De Tar,** Aero Oil Company, New Oxford, Penn.; **John Harper,** Harper Oil Company, Long Island City, N. Y.; **Walter Hochuli,** The Texas Company, New York; **A. M. Hughes,** Phillips Petroleum Company, Bartlesville, Okla.; **R. J. Hull,** Cities Service Petroleum Company, New York; **J. G. Jordan,** Shell Oil Company, New York; **Robert A. Kent,** Kent Oil Company, Salina, Kans.; **Jess Knowles,** Skelly Oil Company, Kansas City, Mo.; **E. F. McCabe,** Tidewater Associated Oil Company, New York; **R. W. McDowell,** Mid-Continent Petroleum Corporation, Tulsa; **Miles Mills,** Oils, Inc., Des Moines, Iowa; **M. H. Robineau,** Frontier Refining Company, Denver; **George L. Savory,** Savory Oil Company, Binghamton, N. Y.; **Roy Thompson,** Apex Motor Fuel Company, Chicago; **L. E. Ulrope,** Esso Standard Oil Company, New York; **J. L. Wait,** Continental Oil Company, Houston; **John H. White,** Hewitt Oil Company, Charleston, S. C.; **Russel S. Williams,** Gasteria, Inc.; Indianapolis; Legal counsellors: **Oscar John Dorwin,** The Texas Company, New York; **Otis Ellis,** National Oil Jobbers Council, Washington, D. C.

J. S. Leach

W. S. S. Rodgers

J. S. Leach, president of The Texas Company, becomes chairman of the board March 1, succeeding **W. S. S. Rodgers,** retiring. At the same time **A. C. Long,** executive vice president, becomes president of the company. In addition, **Colonel Harry T. Klein,** chairman of the executive committee, will retire from active participation in the company April 1.

Leach joined Texaco in 1916 and was elected vice president in 1938. In 1950 he was named executive vice president, and was elected president in April, 1952. He is also a director of the Seaboard Oil Company of Delaware and McColl-Frontenac Oil Company Limited.

Long joined Texaco in 1930 as a service station supervisor in Florida and by

Col. Klein

A. C. Long

1931 was transferred to the Export department where he served in Ireland and the Netherlands. Returning to the U. S. in 1940 he served as assistant to the vice president—foreign operation and in 1947 was appointed vice president—marketing for California Texas Oil Company Limited. He returned to the Texaco organization in 1948 and was elected executive vice president in 1951.

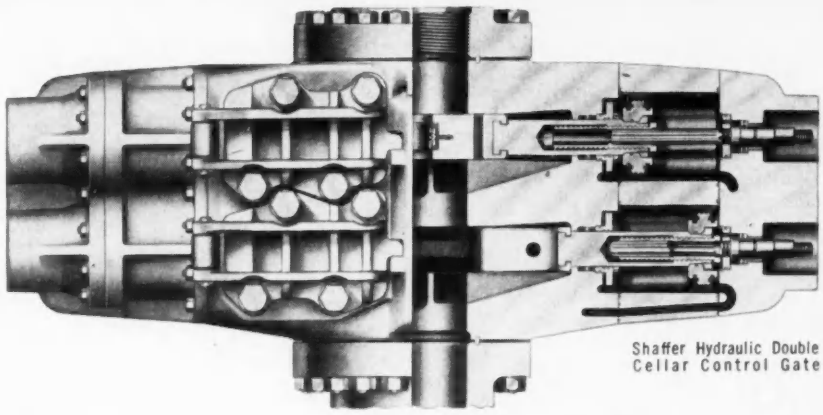
•

James L. Brown, geologist for Shell Oil Company, has resigned and is now associated with **Steven H. Harris,** consulting geologist at Bismarck, N. D. Brown is a graduate of the University of Cincinnati where he received B.S. and M.S. degrees in geology. Prior to his resignation he was district stratigrapher for Shell's Williston Basin district.

•

W. W. Reichenbach has been appointed manager of the Oil Supply and Exchange department of General Petroleum Corporation. Reichenbach has been assistant manager of the department since 1949, and a member of the General Petroleum staff since 1945.

What to Look for when you buy CELLAR CONTROL GATES



Shaffer Hydraulic Double Cellar Control Gate

Cellar Control Gates are an item you don't buy every day. That's why it's so important that you double-check the equipment you buy to make certain it has all the features essential for today's drilling operations.

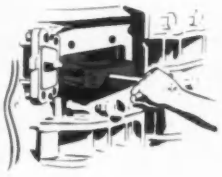
First—SAFETY...

and, of course, that is the MOST important single item. In Shaffer Hydraulic Cellar Control Gates you get safety backed by the organization that pioneered cellar control gates well over a quarter-century ago. But look deeper than safety alone . . .

Look for COMPACTNESS!

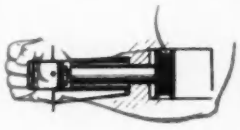
Equipment that is bulky and excessively large can take a high toll in greater rig costs, deeper cellar requirements, cumbersome hook-ups. But Shaffer Hydraulic **Double** Cellar Control Gates (**two** ram compartments unitized in **one** body) require only 30" total height even in sizes as large as 13⅜" (12" Series 900). Shaffer Hydraulic Single Cellar Control Gates require only 18½" in the same size. **Compare these compact dimensions with any other gate of comparable size and rating!**

Look for EASY RAM CHANGE!



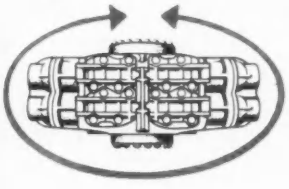
Rams must be changed frequently to meet requirements of varying pipe sizes as wells are drilled. In Shaffer Hydraulic Gates you simply open two doors in the side of the body, slide out the ram assembly, change rams, slide the assembly back in place and bolt the doors. **And complete ram changes can be made with equal ease whether the pipe is in or out of the hole!**

Look for SIMPLE DIRECT DRIVE!



Note how Shaffer Hydraulic Gates have no complicated hook-ups or secondary connections between rams and operating cylinders. Operating pistons are **directly behind** the rams for direct fool-proof drive, fewer parts, positive simplicity!

Look for ENCLOSED DESIGN!



There are no exposed moving parts in Shaffer Hydraulic Cellar Control Gates All operating members are enclosed within the gate body—protected from corrosive muds, from jamming by loose timbers, from abrasive grit and sand!

Look for MUD-FREE DRAINAGE!

No detrimental mud accumulations can interfere with free ram travel in Shaffer Gates because the rams move on high narrow guide ribs above the steeply-sloped ram compartment bottoms. Mud and sand quickly drain back into well—rams are always ready for use.

These and many other features make Shaffer Hydraulic Cellar Control Gates the outstanding choice of leading operators. Compare, point-by-point, and you'll see why! Your nearest Shaffer representative will gladly supply complete details on Shaffer equipment. Or write Direct!

Send for your free copy of the complete Shaffer Catalog!

See the Shaffer section—pages 4525 to 4600—of your 1951 Composite Catalog

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OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th Street
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

30 years OF OIL TOOL LEADERSHIP

G. W. Hart, superintendent of measurement of the General Petroleum Corporation, has been appointed assistant manager of the Gas department. **A. L. Saulsbury** has been named senior drilling foreman for the Production department's southern division. Both will have headquarters at Vernon, Calif.

•

L. A. Braly has been named district landman for Oklahoma by Cities Service Oil Company. Braly joined Cities Service in 1947 as titleman in the Bartlesville office and was transferred to Fort Worth in 1950 as district landman. He will make Oklahoma City his new headquarters.

Michael Hugh Gaffney has retired after 40 years with Gulf Oil Corporation and a career in the oil fields that includes participation in the Lucas Gusher at Spindletop in 1904, Humble in 1905, Burkburnett, in Mexia, in Wortham, Richland Creek; South Liberty, at Orange field, in Vinton, La., in Luling and at Darst Creek near Luling. He began on the drilling rigs and later transferred to warehousing. He joined Gulf when it was known as J. M. Guffey Petroleum Company.

•

Bert Fields, Dallas drilling contractor, has moved his offices to the Fidelity Union Life Building, Dallas.

Wm. Ross Cabeen, principal member of Wm. Ross Cabeen & Associates, has announced discovery of a new major oil field with probable 25 million barrels reserve oil near Oklahoma City. Wm. Ross Cabeen & Associates, geologists and petroleum engineers, operate in California, Oklahoma and Texas. It was the second consecutive discovery out of two prospects developed in Oklahoma by the Cabeen organization in behalf of Macmillan Petroleum Corporation and associates, Blackwood & Nichols of Oklahoma City, and Richard S. Rheem of Los Angeles.

Wm. Ross Cabeen

•

W. R. (Bill) Beam has been appointed landman of the oil development department for Northern Pacific Railway Company. Beam was district landman for The Carter Oil Company at Denver handling the Denver-Julesburg Basin and farm-outs for the northwest region. He was previously employed by Carter in Mississippi. A graduate of Louisiana State University, he was an officer of National Farm Loan Associations in Louisiana and Mississippi before joining Carter.

•

E. A. Eastberg, production and drilling foreman since 1945 for Western Gulf Oil Company's Paloma unit, near Bakersfield, Calif., has been promoted to superintendent of production for the unit. Eastberg advanced from carpenter to roustabout to foreman. In his various capacities in Paloma he has been engaged in the drilling and completion of most Paloma unit wells.

•

J. H. Jerome has been advanced to superintendent of Plant Operations for Western Gulf Oil Company. Jerome joined the company's Paloma unit in 1944 and was named plant foreman in 1945. His gasoline plants experience dates back to 1920.

•

G. T. Nancy has been appointed plant foreman of its Paloma unit by Western Gulf Oil Company. Nancy joined the Paloma unit operation in 1946 as a roustabout and was subsequently transferred to the plant where he rose from operator to instrument man to assistant plant foreman in 1951.

•

William Fendrick, production foreman for Western Gulf Oil Company's Paloma unit operations, had his duties expanded recently when he was given the additional supervision of field maintenance work. Fendrick began work with Western Gulf in 1935 at Mooringsport, La., as an oiler in a gasoline plant and advanced to process operator. He was transferred to California operation in 1944, being promoted to production foreman in 1945.

•

Ralph D. Reber has resigned as land and production superintendent for **L. B. Stableford**, Wichita, and has organized Petroleum Management, Inc., a firm specializing in operation and management of oil and gas properties.

ROUGHNECK—

Scientifically Formulated to combat the Elements!

ROUGHNECK Synthetic Enamel is formulated to meet the needs of the oil industry . . . with **durability** as first consideration. Applied by brush or spray . . . with or without a primer . . . heavy duty contents of ROUGHNECK withstand weather, rough handling and corrosion.

ROUGHNECK is available in color selections for every company requirement. Write **today** for a complete color card.

Supplier Inquiries on ROUGHNECK Industrial Enamels are Invited

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Call on Cyanamid for your chemical requirements...

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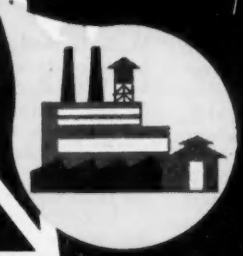
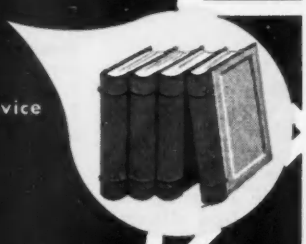
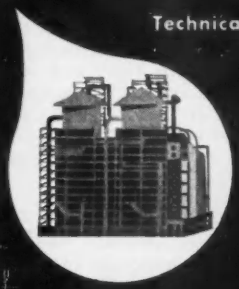
Gelling Agents



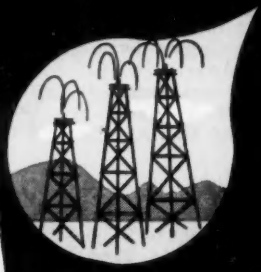
Specialty Catalysts



Technical Service



AEROCAT® MS Synthetic Fluid Cracking Catalysts



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AEROLUBE® Additives

Cyanamid service to the Petroleum Industry is characterized by its ability, based on research, to meet the chemical requirements of the many distinct phases of that industry. Products of the Petroleum Chemicals Department range in application from drilling and refining to additives for lube oils and gelling agents for greases.

With specialists in each phase of production and refining, this integrated department is able to direct its product development work toward the solution of problems affecting the petroleum industry's flow-line from well to consumer.

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Dudley Tower, manager of operations for Union Oil Company of California in its Gulf division with headquarters in Houston, has been elected a vice president. A native Californian, Tower joined Union Oil in 1935 as a pipe line roustabout at Long Beach. He served as assistant engineer at Bakersfield and later as district engineer in Houston. In 1943 Tower became district superintendent of the Gulf division and was made manager of the division in 1947.

•

L. F. McCollum, president of Continental Oil Company, Houston, heads the new Committee on Petroleum Productive Capacity created by the National Petroleum Council at request of the Department of the Interior's Oil and Gas division.

•

Marsh S. Watson, Jr. has joined the firm of Buckles and Hostetler, oil production consultants, at Monahans, Texas. A petroleum engineering graduate of New Mexico School of Mines, Watson received his M.S. in petroleum engineering from the University of Oklahoma. For the past three years Watson has been active in water flood projects in West Texas and resigned as waterflood engineer for Richardson & Bass in the West Texas division to join Buckles and Hostetler.

•

J. B. Sutherland, Los Angeles division manager of The Ohio Oil Company since 1941, became assistant to the manager of Production, January 1. He joined The Ohio in 1917 at Basin, Wyo., and was transferred to Casper the following year, becoming secretary to the Casper division in 1919. Working in Los Angeles in 1927 he became a landman, and was named division landman in 1933. Sutherland is a director of Western Oil and Gas Association.

•

G. C. Wight has been named assistant division production superintendent of Stanolind Oil and Gas Company's Texas-Louisiana Gulf Coast division. Wight formerly was superintendent of the Abilene district. He replaces **S. C. Oliphant** in Houston. Wight joined Stanolind as a roustabout in 1933 and worked in Kansas until 1942 when he served with the armed forces. He returned to Stanolind in 1946 to serve as field engineer at Salt Creek, Wyoming. In 1950 he was transferred to Midland, Texas, as assistant district superintendent of the Midland area, and was named Abilene superintendent in 1952.

•

W. J. Coppinger has organized the Coppinger Drilling Company, Inc., with headquarters at Wichita. Other officers of the organization include **Howard A. Stoskopf,** vice president and landman, and **Henry D. Ficken,** secretary-treasurer. Directors include **O. E. Owens, Neal Cramer** and **A. J. Carter, Jr.**

•

John P. McNaughton retired from the Petroleum Administration for Defense February 1 and has rejoined Neville G. Penrose, Inc., independent producer. He is assistant to the vice president and will make his headquarters in Fort Worth. McNaughton received his geology degree from the University of Oklahoma and a petroleum engineering degree from Colorado School of Mines. He was at one time an employe of Gulf Oil Corporation at Hobbs, N. M.

O. H. Berry, Jr., has joined Vickers Petroleum Company, Wichita, as chief engineer to supervise deep drilling operations. Berry recently resigned from Wilshire Oil Company where he was employed at Midland, Texas, and the Permian Basin. Prior to that he was division engineer with Standard Oil Company of Texas. Berry, whose headquarters will be in Oklahoma City, in addition to acting as technical advisor to the Vickers Company on drilling and production, will handle all of its reservoir appraisal work.

O. H. Berry, Jr.

•

W. S. S. Rodgers, retiring chairman of the board of directors of The Texas Company, has been elected chairman of the trustees of the National Safety Council. Rodgers has been a trustee of the council since 1945 and has had 38 years of continuous service with The Texas Company. Upon his retirement from the company on March 1, Rodgers will remain as a member of the board of directors and of the executive committee.

•

Neal D. Williams has been appointed manager of the Land department of Monterey Oil Company succeeding **C. R. Pickering,** resigned. Williams is a law graduate of Pacific Coast School of Law in Los Angeles, and began his oil career with Continental Consolidated Corporation in Long Beach, Calif., in 1946 as assistant land department manager. When Phillips Petroleum Company acquired Continental Consolidated, Williams was moved to Bartlesville.

•

Bailey W. Vinson, a co-partner in National Associated Petroleum, and managing partner of The Exploration Drilling Company, both of Tulsa, has been elected a director of the First National Bank and Trust Company, Tulsa.

•

William W. Bryan, Esso Standard Oil Company, has been named 1953 chairman of the New Jersey Oil Industry Information Committee succeeding **William M. Amos,** Gulf Oil Corporation. Bryan began his career with Esso Standard in 1926 and now heads the New Jersey sales division at Elizabeth.

•

Professor Albert B. Stevens of Texas A. & M. College Petroleum Engineering Department has been appointed head of the department succeeding **Harold Vance** who left the college to head the oil and gas department of the Second National Bank in Houston. Prof. Stevens became associated with the petroleum engineering field in 1927 when he was employed by Gypsy Oil Company in Oklahoma.

•

Hugh H. Sharpe, III, was recently appointed New England district representative of the Oil Industry Information Committee with offices in Boston. Sharpe formerly was production manager of radio stations in Boston and Lawrence, Mass. He will be associated with Jacques Ellison, Jr., and with Ben Halsell, The Texas Company, who is 1953-54 chairman of the New England OIIC.

E. P. Hayes, former chief petroleum engineer for The Texas Company, has been appointed chief petroleum engineer of the Producing division of the California Texas Oil Company, Ltd. Hayes graduated from the Case School of Applied Science in mechanical engineering in 1915 and began his petroleum industry career at Bartlesville, Okla.

E. P. Hayes

After service in the Air Corps during World War I, he moved to Fort Worth where he became assistant engineer in charge of a helium plant for the U. S. Bureau of Mines in 1925. Following that he did drilling exploration of core holes for potash in West Texas, New Mexico and Utah for the bureau. Later he served in the Petroleum division of the bureau at Bartlesville, Okla., and Dallas. Hayes became affiliated with The Texas Company as petroleum engineer in 1933 in the South Texas division, being named division engineer in 1937. In 1946 he was promoted to chief petroleum engineer, Producing department.

•

Ronald D. Gibbs, has retired as vice president—transportation and distribution for Union Oil Company of California, and **E. L. Hiatt** has been appointed manager of transportation and distribution. Gibbs joined Union Oil in 1918 and served in several capacities until his election to the vice presidency in 1945. Hiatt joined the company in 1933 as a tank truck salesman, working up to assistant to the vice president.

•

F. G. Shafer was recently promoted to division land and leaseman of the Pacific Coast division for The Texas Company's Producing department. Shafer has been engaged in scouting and lease work for Texaco since 1928, and has been assistant division land and leaseman since 1949. From 1944 to 1947 he was in charge of the Portland, Ore., headquarters of the Lands and Leases department.

•

David C. Guinn, petroleum engineer with The California Company has been transferred from Lafayette to Venice, La.

•

Fred M. (Doc) Seibert, assistant to the vice president and for many years chief chemist for Gulf Oil Company's Houston Production division, has retired. Seibert joined Gulf in 1917 after four years service with the U. S. Bureau of Mines. He is a graduate in chemical engineering of Pennsylvania State College, and received his Ph.D. from Princeton University. At the Bureau of Mines he and his collaborators were the first to separate petroleum gas into its component hydrocarbons. He is especially known for his work in oil and gas conservation, one of his first undertakings was the development of methods of removing oil more efficiently from oil-salt water emulsion. He invented an electrical dehydration system which, when combined with the use of centrifugal force, proved more efficient than older methods. He also pioneered development of drilling muds.

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MONSANTO CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Sherman S. Seltzer, 58, president of Royal Petroleum Corporation and Southwestern Oil and Refining Company, died December 5 at New Rochelle, N. Y.

•

Ernest O. Stough, 48, geologist with Tide Water Associated Oil Company, Tulsa, died January 23 in Tulsa. He had been with Tidewater for 16 years.

•

Ed. S. Hill, 82, died December 19 in Fort Worth. He operated as the Ed. S. Hill Company until 1929 when he and his children created a partnership. He was a royalty and lease trader.

•

Fred M. Clement, 42, died December 21 in Denver. He had only recently been promoted to regional production manager for Continental Oil Company at Oklahoma City.

•

John B. Foster, 70, pioneer Oklahoma oil operator, died January 17 in Oklahoma City. He had been active in the Mid-Continent area and at one time was associated with Gilliland Oil Company and with such pioneer oil men as Waite Phillips, W. G. Skelly, Tom Slick and Charlie Wrightsman.

•

Aubrey Dale McTaggart, 59, an employe of the Acme Fishing Tool Company for over 39 years, died January 12 in Marietta, Ohio. McTaggart began his oil tool manufacturing career under the supervision of Acme's founder, George L. McKain, and through the years became an expert on manufacture, use and care of cable tools.

DEATHS

Nowery J. Smith, 54, Houston oilman, died January 5 at Kerrville, Texas. Born at Parkersburg, W. Va., in 1898, Smith became purchasing agent for Republic Production Company, Houston, in 1920-1923. At that time he was elected vice president of Petroleum Supply Company, Houston, and served in that capacity until 1929 when he organized the Nowery J. Smith Supply Company. He also served as vice president of Parkersburg Rig and Reel Company through 1947.

Nowery J. Smith

•

Walter Brown, 66, died December 9 in Tulsa. He had been with the Exploration department of Sinclair Oil & Gas Company for the past 12 years but formerly was part owner of the Crest Oil Company, a drilling and production firm.

•

Nelson D. Wells, 92, died December 6 in Tulsa. Wells helped develop a number of oil fields including an Oklahoma field near Cleveland. His drilling machine, patented in 1907, allowed faster oil well spudding operations and was used for many years.

Frederick H. Bedford, Jr., 61, a director of Standard Oil Company (N. J.) for the past 25 years, died December 3 in Barranquilla, Colombia. A graduate of Amherst College, Bedford joined the company in 1914. In 1928 he supervised the organization of Standard Oil Company of Pennsylvania. Ethyl Corporation listed him as a director in 1948.

•

Thomas L. Taggart, manager of the Natural Gasoline department of Standard Oil Company of California since 1942, died in San Francisco, January 22.

Taggart had worked for Standard since 1927. For ten years he served as contract superintendent for Standard Gasoline Company, a subsidiary, and then in a similar position for the Company's Natural Gasoline department until 1942.

Born in County Antrim, Ireland, he was educated at the University of Belfast, and the University of Leipzig, in Germany, before serving in World War I as an officer in the Royal Irish Rifles.

•

Charles G. Boone, 63, inventor of many oil field devices, died November 25 in Tulsa. He held 153 patents on hydraulic oil field equipment and other inventions.

•

George S. Allee, 79, former president of the Missouri Oil Men's Association, died November 30 in Kansas City. Allee was a charter member of the national organization for oil men.

•

Henry A. Hodgson, 68, retired construction engineer for Gulf Oil Corporation, died Dec. 7 in Tulsa. He had been with Gulf for 38 years. He had retired in 1948.

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COMPANIES IN THE NEWS

GULF OIL CORPORATION has announced numerous changes in its Production department: **E. D. Brockett, Jr.**, formerly chief of Exploitation and Engineering, was appointed assistant to the general manager of Mene Grande Oil Company and will make his headquarters at Caracas, Venezuela. **L. G. May,** assistant to the chief of Exploitation and Engineering, was named acting chief of that branch and will advise the vice president-production on drilling, production and engineering matters.

•

W. C. McBRIDE, INC. will operate production facilities for Kansas and Oklahoma out of one office in the same fashion as it now operates exploration activities. **Frank Zimmerman** will direct the production facilities with the title of division production superintendent for Kansas and Oklahoma.

•

SHELL OIL COMPANY has announced major organizational changes in its expanding exploration and production operations. **E. W. Masters,** in addition to continuing his duties as area production manager, was named executive assistant to the vice president. **F. R. Schmieder** was appointed general superintendent of Shell's Western Production operations with headquarters in Los Angeles. **R. R. Robison** succeeds Schmieder as San Joaquin division production manager in Bakersfield, and **J. E. Gallagher,** now superintendent in Bakersfield, replaces Robison as Coastal division superintendent at Ventura, Calif. **P. E. Lehr** has been appointed division production manager at Long Beach, Calif. Other Los Angeles Basin division changes name: **R. A. Malott,** drilling foreman, as Brea district superintendent; **D. K. Stewart,** production foreman, as Long Beach district superintendent; **K. T. McCamman,** production foreman at Bakersfield, as Coastal division superintendent for Ventura.

•

COASTAL CARIBBEAN OILS, INC., is a new, independent company organized to work Florida properties owned by **GULF AND COASTAL PETROLEUM,** wholly owned subsidiary of **PANCOASTAL OIL CORPORATION** (American). These properties consist of five oil, gas and mineral leases, principally along the Florida west coast. One consists of a continuous ten-mile-wide water bottom strip from Appalachicola Bay in the north to a point six miles below the city of Naples at the southern end of Florida, a total of more than 400 miles. Another lease includes 467,000 underwater acres in Lake Okeechobee. The company will begin deep drilling on these leases in 1953.

•

THE TEXAS COMPANY has transferred 14 employes from Signal Hill, Calif., Laboratory to the research division of the Producing department's Bellaire, Texas, Laboratories. The men involved in the transfer are: **W. W. Robinson, Jr.,** assistant to director of research; **A. J. Belansky, Jr., V. N. Bednarski, David L. Cramer, Robert A. da Roza, George C. Ellis, Jr., Wilbur L. Hall, Theron Johns, James L. Maddox, Jr., Alfred C. Nestle, Victor J. Tronolone** and **W. J. Weiss,** all chemists; **Raymond J. Strawinski,** bacteriologist; and **Charles Forsey,** laboratory assistant.

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Association News

API Production Meeting Convenes in Fort Worth

The Southwestern District, Division of Production, of the American Petroleum Institute, will meet in Fort Worth, March 4-6, at the Hilton Hotel. F. E. Hatfield, Gulf Oil Corporation in Fort Worth, is chairman of the general arrangements committee. Madison I. Taylor, Gulf Oil Corporation, Fort Worth, is vice chairman of the general arrangements committee.

Other chairmen for the meeting are: Louis F. Davis, The Atlantic Refining Company at Dallas, program; S. J. Iverson, Iverson Supply Company in Fort Worth, entertainment; Ray Elner, Kobe, Inc. in Fort Worth, registration; Roy T. Durst, Rowan Drilling Company in Fort Worth, housing and meeting room; and W. L. Ambrose, Cities Service Oil Company, together with Leroy Menzing, Fort Worth Star Telegram, publicity.

Sessions scheduled for March 4 will be devoted to drilling and production practice and training committees. March 5 and 6 sessions will be devoted to general and technical group sessions.

NACE To Install 1953-54 Officers at Convention

Officers for 1953-54 will be installed by the National Association of Corrosion Engineers at their annual banquet, March 19, at the Hotel Sherman, Chicago. The new officers are Walter F. Rogers, Gulf Oil Corporation, Houston, president; Aaron Wachter, Shell Development Company, Emeryville, Calif., vice president, and Russell A. Brannon, Humble Pipe Line Company, Houston, reelected treasurer.

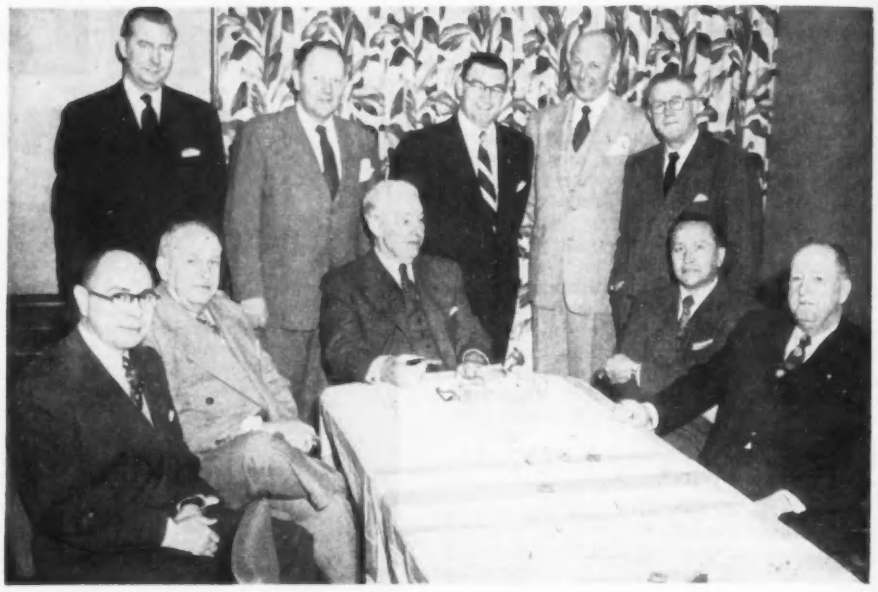
Another banquet feature will be presentation of the Whitney and Speller awards.

The F. N. Speller award, in recognition of achievement in corrosion engineering, will be presented to Scott P. Ewing, corrosion engineer with Carter Oil Company, Tulsa. The Willis Rodney Whitney award in recognition of achievement in corrosion science will be presented to Robert M. Burns, chemical coordinator and director of chemical and metallurgical research for Bell Telephone Laboratories, Murray Hill, New Jersey.

Rocky Mountain AAPG Convenes In Casper, Wyo., April 22-24

Representatives to the 3rd annual meeting of the Rocky Mountain section of the American Association of Petroleum Geologists will converge on Casper, Wyo., April 22-24. The Rocky Mountain section includes nearly one-third of the entire U. S. and the housing committee has made arrangements for hotel, private home and Pullman accommodations.

L. F. McCollum, president of Continental Oil Company, is the featured speaker for the meeting. The search for radioactive materials in the region will be reviewed by V. E. McKelvey, chief of the Trace Elements Section, U. S. Geological Survey. The program will include discussions of the various prospective and productive areas of the Rocky Mountain region, with special attention devoted to the Williston Basin area.



Kansas City Oil Men Name Officers

The Oil Men's Club of Kansas City recently elected its 1953 Board of Governors. It includes, left to right, seated: H. K. Bowers, Socony-Vacuum Oil Company; J. N. Koontz, Sinclair Refining Company; Jay W. Wilson, retired division manager for Standard Oil Company (Ind.); A. L. Mallen, Skelly Oil Company, and Greg Burns, Butler Manufacturing Company. Back row, left to right: Jerome O. Hendrickson, Oil Industry Information Committee; Clark Lillis, Southern Oil Company; J. B. Dickey, Continental Oil Company; Carl E. Bolte, formerly of Battenfeld Grease and Oil Corporation, and W. M. Gadberry, Columbian Steel Tank Company. Reelected as officers of the Club were: Wilson, chairman; Bolte, vice chairman; Burns, vice chairman, and Hendrickson, secretary-treasurer.

National Engineers' Week Set Feb. 22 Through 28

Engineers throughout the U. S. will mark National Engineers' Week, February 22 through 28, with special meetings, displays and other activities designed to call to the attention of the public the role played by engineers in today's way of life.

Each year, the National Society of Professional Engineers sets aside a week for the observance. The week of George Washington's birthday was chosen as Washington is generally recognized as this country's first engineer.

Primary aim of National Engineers' Week is to interest young people of pre-college age in engineering. While the country has 400,000 engineers, it is estimated that there is a need for 100,000 more than will be available in the near future.

April 4 Marks Anniversary For Williston Celebrants

Williston's 2nd Annual Oil Celebration Day will be held April 18 to observe the anniversary of the Williston discovery well on April 4, 1951. Parades, carnivals, banquets, contests and other entertainment are scheduled for the occasion.

The principal speaker for the occasion, chosen each year from the company providing the largest contribution to North Dakota's snow-balling petroleum industry, will be Dr. Robert E. Wilson, chairman of the Standard Oil Company (Ind.). Standard Oil currently is buying nearly all of North Dakota's crude oil production and will erect a refinery at Mandan.

Panel Appointed to Guide Minerals Research Policy

A panel of specialists in geology, mining and geophysics, members of which represent industry, government and the universities, has been established to advise the National Science Foundation on policy questions connected with the recommendations of the President's Materials Policy Commission for development of mineral resources.

Members of the panel are John G. Bartram, Stanolind Oil and Gas Company, Tulsa; Alan Bateman, Yale University; James Boyd, Kennecott Copper Company; Arthur H. Bunker, Climax Molybdenum Company; Paul D. Foote, Gulf Research and Development Company; L. C. Graton, Harvard University; John Gustafson, M. A. Hanna Company; Thomas Nolan, U. S. Geological Survey; Louis Slichter, Institute for Geophysics, University of Calif.; John Vanderwilt, Colorado School of Mines; Clyde E. Williams, U. S. Geological Survey; Donald H. McLaughlin, Homestake Mining Company; Andrey A. Potter, Purdue University; Earl P. Stevenson, Arthur D. Little, Inc.; Paul E. Klopsteg, National Science Foundation.

AGI Appoints Dr. Robert Webb

Dr. Robert W. Webb has been appointed to the dual capacity of executive director of the American Geological Institute and executive secretary of the Division of Geology and Geography of the National Research Council. Dr. Webb has taken leave of absence from Santa Barbara College, University of California, where he is professor of geology.

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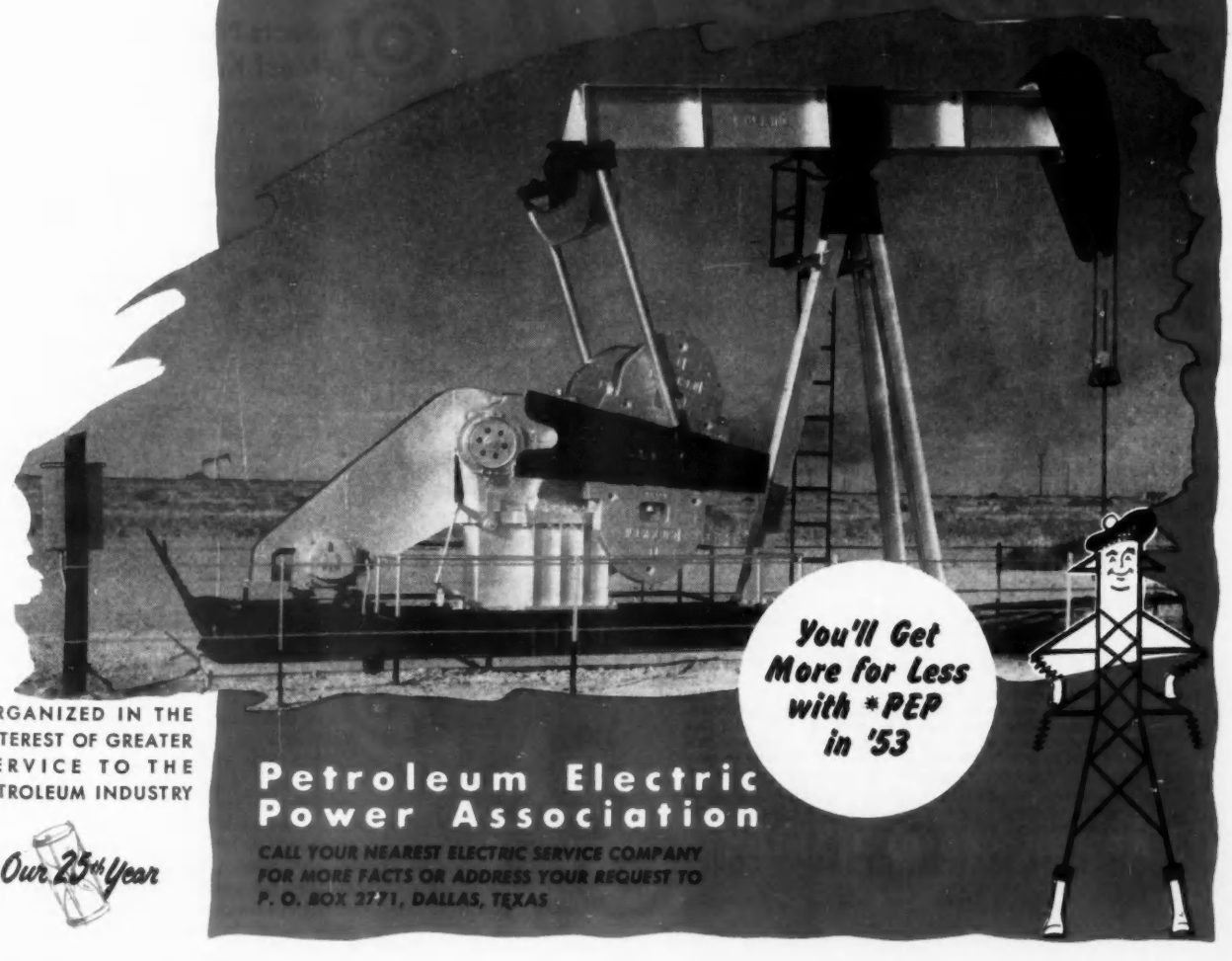

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Dallas Petroleum Engineers Elect Woodward, President

The Petroleum Engineers' Club of Dallas has announced the 1953 slate of officers elected at their December meeting. Glen E. Woodward, president; Nick Tinker, first vice president and program chairman; Gus Prutzman, second vice president and arrangements chairman; Nick Lanyi, third vice president and membership chairman; and Mac Oliver, secretary-treasurer.

Bill Gottshall, Continental Supply Company in Dallas, was the speaker for the Club's January meeting in the Adolphus Hotel.

Subsurface Geology Symposium To Meet March 3-4 at Norman

A Subsurface Geology Symposium will be conducted by the University of Oklahoma, Geology and Short Courses Departments, March 3-4 at Norman. Well logging techniques will be featured March 3, with representatives of Schlumberger Well Surveying Corporation, Halliburton Oil Well Cementing Company and Lane Wells Company presenting papers. On March 4 the theme will be occurrence of oil in sedimentary basins. Among others, T. E. Weirich will present the paper "The Shelf Principle of Oil Origin, Migration and Accumulation."

Photogrammetry Society Names A. O. Quinn Head

Alfred O. Quinn

Alfred O. Quinn, chief of engineering and field survey departments of Aero Service Corporation, has been elected president of the American Society of Photogrammetry. Arthur C. Lundahl, assistant engineer of the U. S. Navy Photo Interpretation Center, was named first vice president, and John I. Davidson, of the U. S. Geological Survey, was elected second vice president.

Ford Heads Gulf Coast AIME

Kenneth B. Ford, of J. R. Butler Company, Houston, was elected 1953 chairman of the Gulf Coast Section, AIME, at the January meeting. He succeeds Dr. George R. Gray, Baroid Sales Division, National Lead Company. Others elected are: H. F. Hopkins, Halliburton Oil Well Cementing Company, vice chairman, and P. W. Cawthon, City National Bank of Houston, secretary-treasurer. Directors elected for two year terms are: H. M. Krause, Humble Oil & Refining Company; R. A. Bobo, Phillips Petroleum Company, and W. F. Hebert, The Texas Company. Holdover directors are R. M. Darling, Stanolind Oil and Gas Company, and Dr. Gray, retiring chairman.

Products Pipe Line Conference To Meet Kansas City, April 22

The Division of Transportation of the American Petroleum Institute has announced a preliminary program for the 4th annual Products Pipe Line Conference to be held at the Hotel Muehlebach, Kansas City, April 20-22. On Monday, April 20, two sessions are scheduled for presentation of technical papers, to be followed by a fellowship hour in the evening.

Field trips scheduled for Tuesday include trips to Sugar Creek refinery of Standard Oil Company (Ind.) and pumping stations operated by Phillips Petroleum Company and Great Lakes Pipe Line Company at Paola, Kansas, and to the Socony-Vacuum terminal in Kansas City; and perhaps a visit to Great Lakes Pipe Line Company's terminal.

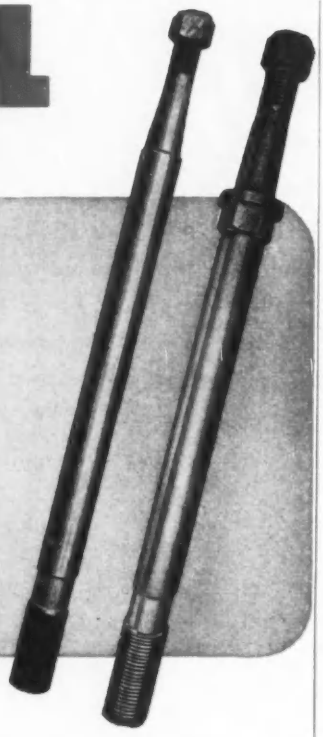
Wednesday, April 22, meetings include a panel session and a round table discussion.

Fulham Joins Relations Staff Of Western Oil and Gas Group

Edward T. Fulham, for the past five years assistant to the director of Public Relations at Chase National Bank, New York City, working particularly with the petroleum department of the bank, has joined the staff of the Western Oil and Gas Association as a public relations representative. He will work with John Funk on the West Coast Oil Information Committee program. Fulham also has had newspaper experience on daily and weekly papers on the West Coast.

RED DEVIL

"DIA-HARD" PISTON RODS



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For tapered type rods

The usual practice of removing pistons from rods by blows of a sledge hammer often damages either pistons or rods. A Red Devil piston puller easily and quickly removes badly stuck pistons without injury to either part. All elements are made of finest quality alloy steel, heat-treated for strength and long life. Write for Catalog No. P-106.

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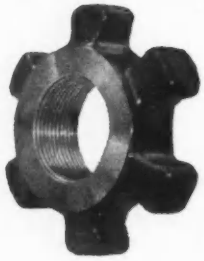

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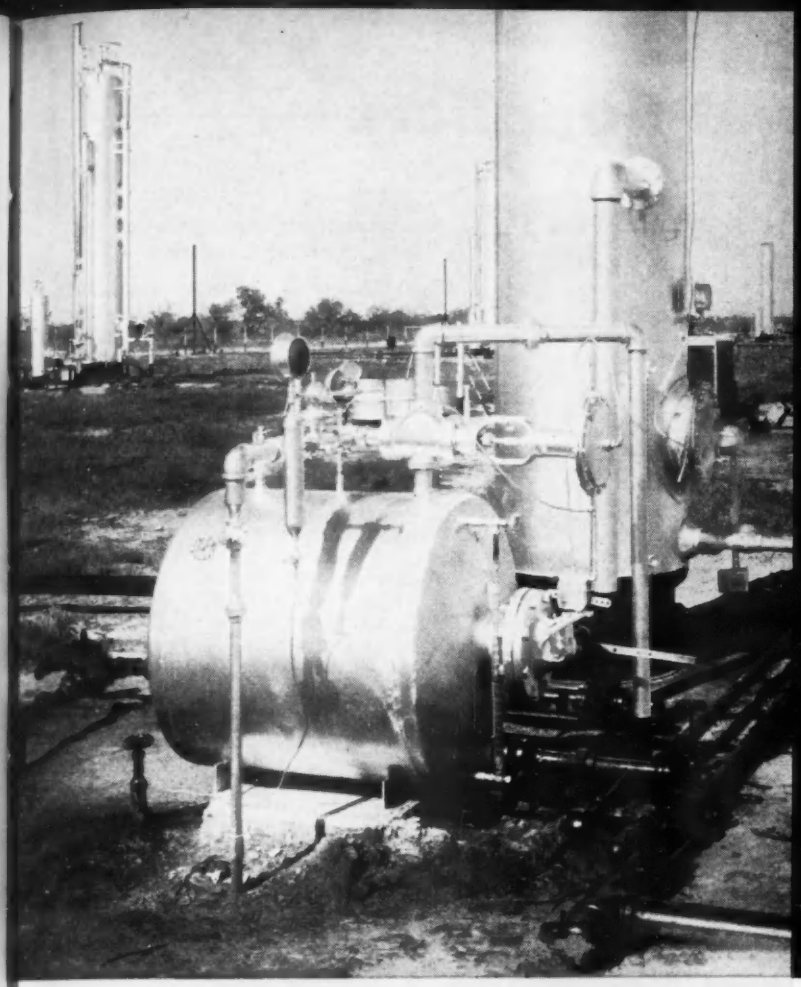

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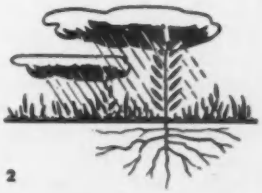
. . . and BORASCU

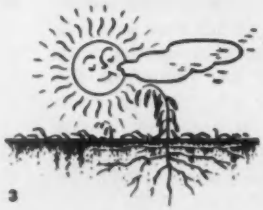
NO WATER TO HAUL



2

RAINFALL adds Borascu to soil solution; quickly carries it to all roots in control area.

NO MORE WEEDS



3

BORASCU in soil solution is taken up by plant roots to complete the killing process.

Here's real economy, practical as it is thrifty, for your "grassing" operations. Weeds can't grow in ground properly treated with BORASCU . . . areas remain bare one to two years after application! You can figure savings may total as much as 80% compared to old-fashioned hoeing methods . . . that's why BORASCU continues to be first choice with economy-minded production men in oil fields across this continent; from Canada to Venezuela . . . by major and independent operators alike. It is a granular material packed in easy-to-handle 100-lb. multi-wall paper bags. There is *no* risk with safe, non-poisonous, noncorrosive* and nonflammable BORASCU. Write for details today!

**To Ferrous Metals*

Literature Available in English or Spanish

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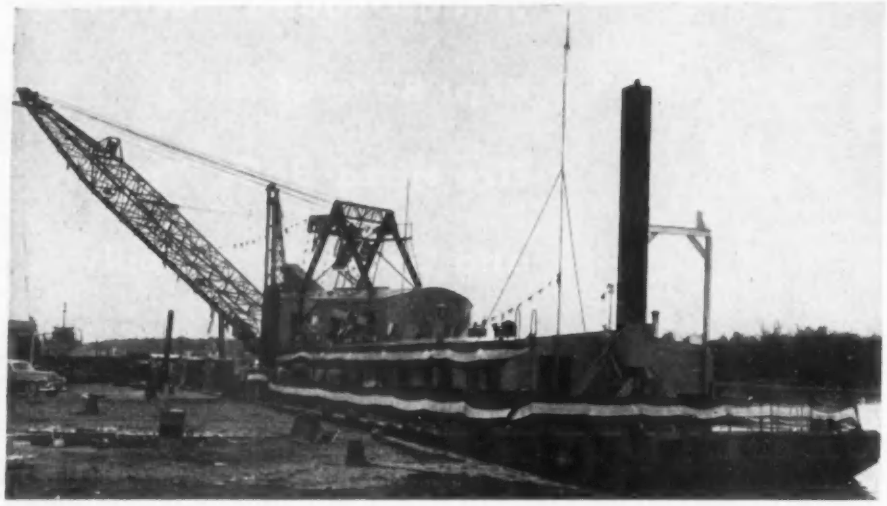
•

Borascu Field Men and Distributors are located throughout the Oil Fields of U.S.A., Canada, Mexico, Colombia, and Venezuela.

News of Service and Suppliers



Super Dragline Barge Dedicated

Avondale Marine Ways, Inc., recently completed a second super dragline barge which was christened the Ralph T. McDermott by J. Ray McDermott & Company, Inc. The barge is equipped with a 200W Bucyrus Erie dragline unit and is powered by a 550 horsepower diesel engine capable of handling an eight yard bucket under favorable conditions. Provision was made for installation of "walking shoes" to enable the barge to move onto the bank under its own power. The McDermott Company will use the barge to cut waterways and to deepen and widen narrow canals to make them accessible to conventional drilling equipment.

American Locomotive Reassigns Executive Responsibility Area

American Locomotive Company has reorganized the administrative structure of its company and appointed various executives to new operation, manufacturing and sales positions. Hunter Michaels was appointed vice president—operations for the company with direct responsibility for all plant operations.

D. W. Cameron was named vice president—manufacturing and Manual Alonso was appointed vice president—foreign sales.

Michaels has been in charge of the Railway Steel—Spring Division since 1950, and a director of the Division since 1944. Cameron, formerly manager at Montreal Locomotive Works and more recently located at Alco's Schenectady plant, started his career in the locomotive industry in 1917. Alonso, born in San Sebastian, Spain, has been in Alco's foreign sales department since 1928.

Continental Supply Company Appoints Five Store Managers

The Continental Supply Company has named new store managers at five locations in the Southwest. Howard D. McFaddin, field salesman at Hadacol Corners, Texas, has been named store manager at Tatum, N. M., Robert D. Hoover, former field auditor for the North and West Texas and New Mexico division, was named manager of the Hobbs, N. M., store.

In Louisiana, R. A. Broussard, store manager at Houma, has been transferred to Harvey in the same capacity. John C. Butler, formerly bookkeeper at Lake Charles, has been named store manager at Eunice. Edward C. Dawson is the new manager of the Houma store. He formerly was field salesman for that area.

E. L. Bissett Named McEvoy Warehouse Manager at Alice

E. L. Bissett was recently placed in charge of the McEvoy warehouse located at the Alice Specialty Company at Alice, Texas. Bissett joined McEvoy Company in January, 1952. McEvoy ships gaslift valves, McEvoy automatic lubricated gate valves, casing heads, tubing heads, adapter flanges and other oil well completion requirements from its Alice warehouse. Bissett will have responsibility for supplying the territory surrounding Alice.

E. L. Bissett

Tubular Products Division Names Newell, Consulting Metallurgist

Tubular Products Division of The Babcock & Wilcox Company has appointed two metallurgists to its staff.

Harold D. Newell, newly appointed consulting metallurgist, has been chief metallurgist since 1927 and in his new post will be relieved of detail work. Associated with B&W since 1919, he has pioneered the development of many alloy tubing steels which are now used in high-temperature high-pressure applications.

John J. B. Rutherford was named chief metallurgist of the Division. Prior to his association with B&W in 1938, Rutherford was a metallurgist with American Chain & Cable Company and U. S. Steel Corporation.

LeBus Announces Service Outlet In South American Countries

Establishment of complete sales, service and engineering outlets were announced recently by LeBus International Engineers, Ltd., as a result of a trip through South America by Earle J. Calk, general sales manager.

Earle J. Calk

Petroleum Service and Supply C. A. of Maracaibo and Caracas, Venezuela, is the South American company which will handle LeBus service and warehouse activities in those two cities as well as Anaco, Venezuela, Peru and Colombia. The company is headed by J. B. Harder, Al Thomas and Charles Smith.

LeBus will also establish a service and warehouse outlet in Mexico City. In May, Calk will visit Europe and the Middle East to establish outlets in those areas.

Lane-Wells Creates Geophysical Section Under John Stick, Jr.

Lane-Wells has created a geophysical section and has named John Stick, Jr., formerly chief electrical engineer and associated with Lane-Wells since 1937, as chief geophysical engineer in charge. During the war, Stick worked on a special war project for the Division of Physical War Research at Duke University.

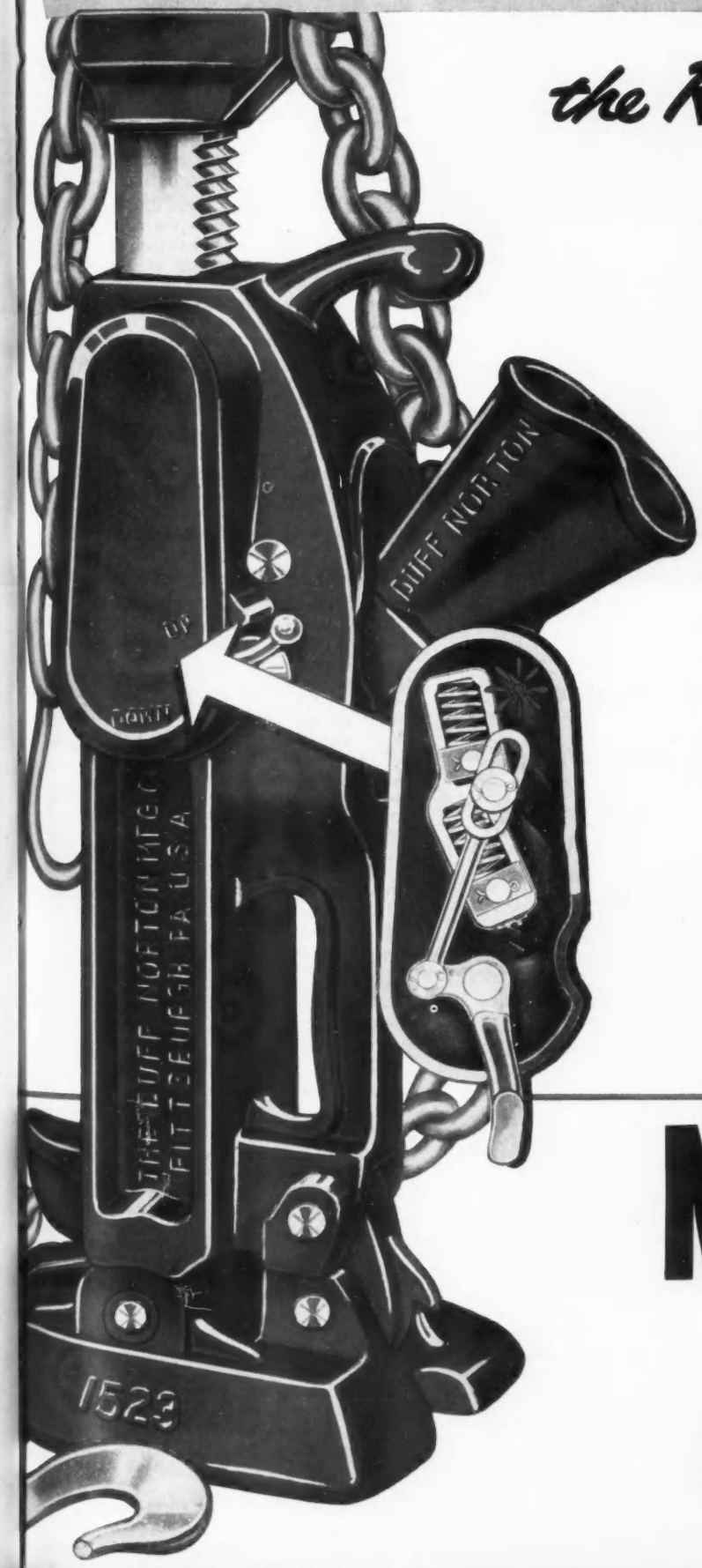
John Stick, Jr.

A. B. (Burm) Winter, assistant chief electrical engineer, has been appointed chief electrical engineer of the new geophysics section. He joined Lane-Wells in 1934 as a gun perforating operator in California and has subsequently held various jobs with the company, including 18 months in Trinidad as a Lane-Wells representative.

American Wire & Steel Names Slenker to Executive Post

John A. Slenker has been named assistant vice president of operations of American Steel & Wire Division, U. S. Steel Corporation. Slenker formerly was district manager of operations at Duluth, Minn. He graduated in metallurgy from Pennsylvania State College and began his association with American Steel & Wire at Donora, Penn., Steel Works in 1935. He has subsequently served in Cleveland, Worcester, Mass., and Duluth installations.

Why this special oil field jack will give longer trouble-free service



the Roustabout "1523"

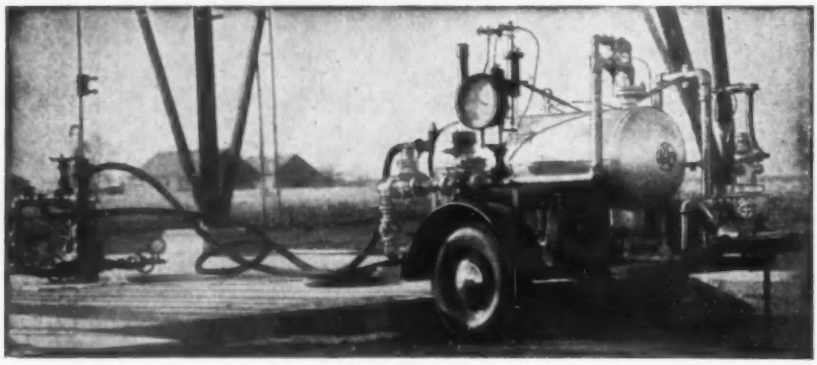
When Duff-Norton engineers set out to design safer, longer-lasting jacks for men who work in the oil fields, they discovered one startling fact—about 90% of jack maintenance was in replacing worn springs in the mechanism that controls the jack's raising or lowering action. Result? The Duff-Norton Roustabout "1523" oil field jack is equipped with a patented*, adjustable spring mechanism which assures positive engagement of rack teeth. The spring's tension can be easily adjusted with a screw driver without removing any part of the jack. Should the spring eventually lose its resiliency, there's no need to send the jack to a repair shop. A new, complete spring mechanism assembly can be quickly installed by anyone in a matter of minutes right in the field, making the jack as good as new!

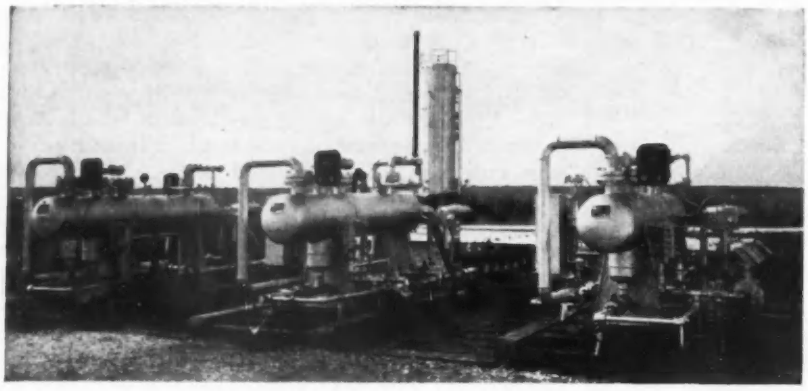
Complete with detachable steel chain, this versatile jack can be operated at any angle at its full 15-ton capacity. Ask your supply store salesman for the Duff-Norton Roustabout "1523." He has it in stock or can get it for you quickly. For complete specifications on this and other dependable Duff-Norton jacks, write the world's oldest and largest manufacturers of lifting jacks for special Oil Field Jack Bulletin AD19C, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian Plant—Toronto 6, Ontario.

"Giving Industry A Lift Since 1883"

DUFF-NORTON *Jacks*

WELLCHECKERS





By ROLO give you accurate production records on your wells

PERMANENT AND PORTABLE WELLCHECKERS BY ROLO separate your well fluid into three phases of oil, gas and water, and meter each accurately. This enables operators to check well production daily, and secure accurate tax and royalty records.

Made in various sizes and working pressures to fit any operation, the installations shown above are typical of the many Rolo Wellchecker units now in use throughout the industry.

Rolo Wellcheckers are shipped completely piped and ready to operate. You need only connect inlet and outlet. In addition to oil meter, B. S. & W. sampler, gas run, orifice meter, fittings and all controls, free water knockout with meter can be furnished to separate and continuously remove free water from well fluid.

Write today about your well testing and oil metering requirements, and let us work with you on your problems.

Ask for illustrated Catalog W-52, with complete description of all wellchecker units, made only by Rolo.

Crude Oil Metering Specialists

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Petroleum Industry Consultants, Apartado 3992, Caracas, Venezuela
EXPORT OFFICES: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

Odus C. Tubbs E. M. Fetzer

Continental Supply Transfers Fetzer to Canadian Subsidiary

E. M. Fetzer, formerly manager of Production Equipment Division of The Continental Supply Company at Dallas, has been appointed manager for The Continental Supply Company, Ltd. in Calgary, Canada. J. H. Berry is managing director of the Canadian subsidiary. Fetzer has been with the company since graduation from Oklahoma A. & M. College in 1929. He has been located in the Dallas office since 1935.

Odus C. Tubbs has been advanced from the Houston district office to succeed Fetzer at Dallas. Tubbs graduated from Louisiana Polytechnic Institute and served with the U. S. Engineering Department until 1936 when he joined Continental.

George Turechek Is Lane-Wells' New Engineering Consultant

Lane-Wells Company has appointed a veteran executive, George F. Turechek, to the newly created post of consulting engineer. Turechek was present at the first gun perforating of an oil well by Lane-Wells and has watched the company grow from a small shop in 1932 to its present world-wide organization. A graduate of Drake University, Turechek is the author of many engineering and scientific articles and has supervised testing of more than 5000 bullets and powder combinations. His inventive talent has been reflected in many product and service improvements.

George F. Turechek

Burns To Represent Macwhyte

Thomas E. Burns has been appointed direct factory representative for Macwhyte Company with headquarters in Houston. He will represent the wire rope manufacturer in its Houston territory including an area in Louisiana. He has been employed by Macwhyte Company in various capacities for the past 12 years.

Studying Latin Sales Market

Ed T. Landgraff, manager of Chiksan Export Company, Newark, is on a four-month trip through Latin America where he will study applications of Chiksan products in Latin American oil fields, refineries, docks and industrial plants. He will investigate possible changes in marketing procedures for this market.

You can sit down and *Relax*—

when you call in PGAC to Log and Perforate your well

When you're ready for completion services — you're trying for the jack-pot. You've gambled enough to get that far . . . why gamble on your pay-off?

That's the time to call in the *most reliable* logging and perforating services you can retain. There is still no substitute for the *scientific equipment* — or the *17 years of experience and know-how* — behind every PGAC completion job.

Play it safe (sit down and relax!) . . . let us log and perforate your next well. Then you'll see for yourself *why* so many operators prefer PGAC services. There is a reason!

These PGAC completion services are available to you on a moment's notice, *around the clock*, every day in the year:

Simultaneous Radiation Logging
Brons Neutron/Neutron Logging
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Bullet Perforating
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Open Hole Jet Shot
Baker Wire Line Services

PGAC PERFORATING GUNS ATLAS CORPORATION

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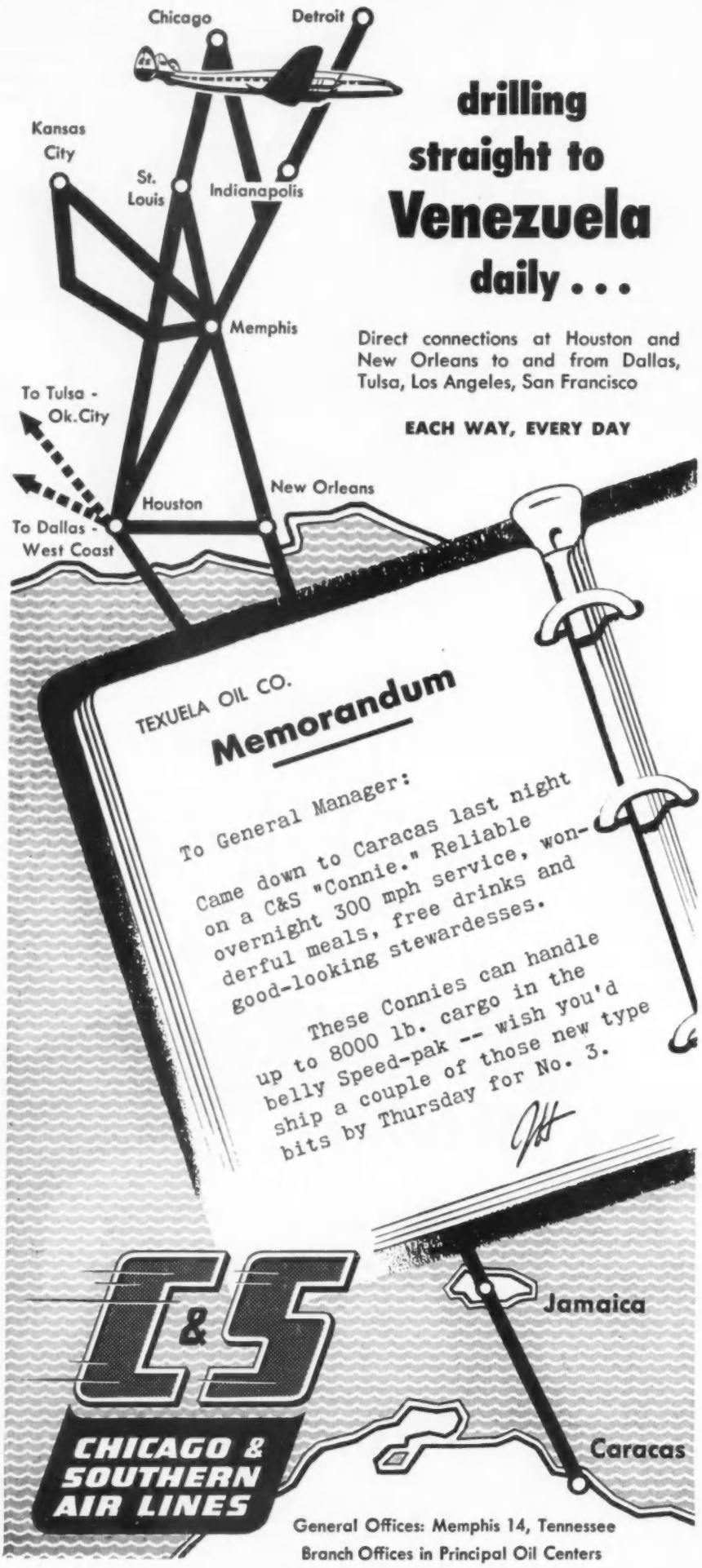
General Offices: 3915 Tharp St. — Sales Office: Melrose Bldg. — Main Plant: 7730 Scott St.

22 OFFICES TO SERVE YOU

TEXAS: Houston, phone LYnchburg 4161 — Corpus Christi, phone 3-1324 — Dallas, phone RAndolph 2943
Longview, phone 4905 — Abilene, phone 2-4172 — Mission, phone 1225 — Alice, phone 713 or 410
Gainesville, phone 2517 — Odessa, phone 6-6429 — Beaumont, phone 2-4263 — Victoria, phone 1023
LOUISIANA: Shreveport, phone 3-1648 — Lake Charles, phone 4724 — Lafayette, phone 8-3495 or 4-1449
OKLAHOMA: Oklahoma City, phone CEntral 2-5342 — Pauls Valley, phone 1577 — Seminole, phone 2938
NEW MEXICO: Hobbs, phone 3-5852 KANSAS: Great Bend, phone 4306 or 4307

Canadian Affiliate: PERFORATING GUNS OF CANADA, LTD., Edmonton, Alberta, Canada


Chicago
Detroit
Kansas City
St. Louis
Indianapolis
Memphis
To Tulsa - Ok.City
To Dallas - West Coast
Houston
New Orleans
drilling straight to Venezuela daily . . .
Direct connections at Houston and New Orleans to and from Dallas, Tulsa, Los Angeles, San Francisco
EACH WAY, EVERY DAY
TEXUELA OIL CO.
Memorandum
To General Manager:
Came down to Caracas last night on a C&S "Connie." Reliable overnight 300 mph service, wonderful meals, free drinks and good-looking stewardesses.
These Connies can handle up to 8000 lb. cargo in the belly Speed-pak -- wish you'd ship a couple of those new type bits by Thursday for No. 3.
Jamaica
Caracas
C&S
CHICAGO & SOUTHERN AIR LINES
General Offices: Memphis 14, Tennessee
Branch Offices in Principal Oil Centers

C. C. Lister Appointed President Of United Geophysical Company

C. C. Lister has been elected president of United Geophysical Company replacing Herbert Hoover, Jr., who continues as chairman of the board of directors.

C. C. Lister

Other changes included the naming of R. G. Sohlberg, recently manager of Canadian operations, as vice president of operations with offices in Pasadena, Calif.; and S. O. Patterson, formerly assistant manager in Canada, as Canadian operations manager.

Lister joined United Geophysical Company in 1937 after association with Mid Continent Petroleum Corporation at Tulsa. Engaged in foreign service from 1937-1947, Lister was a member of United's first party to Trinidad, and subsequently worked in Brazil and Colombia.

F. E. Siever Named Sales Manager in Permian Basin

F. E. (Ed) Siever has become sales manager in the Permian Basin for Petroleum Tool Company and Smith Bit Distributing Company, of Odessa, Texas. Siever had been division manager for Technical Oil Tools Corporation in West Texas and New Mexico since 1947 and had worked for TOTCO since April 1940, with the exception of two years during World War II. He moved to Hobbs, N. M. in 1936 and, between then and 1940, worked for Guy H. Hooper Clay Company, Noble Drilling Company, and Houston Oil Field Material Company.

F. E. Siever

Kaiser Steel Promotes Cosgrove

J. M. Cosgrove has been appointed to the newly created position of manager of Tin Plate Sales for Kaiser Steel Corporation. Cosgrove previously was Northwest district sales manager at Seattle. A graduate of Portland (Ore.) University, Cosgrove has been in the steel business since 1930. He joined Kaiser Steel in 1945.

Emsco Announces Name Change

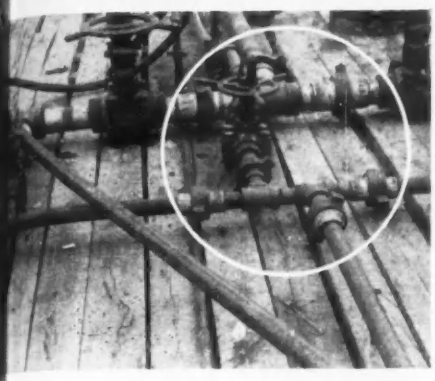
Emsco Derrick & Equipment Company has changed its name to Emsco Manufacturing Company. The change was effective January 1. Emsco has plants in Los Angeles and at Garland and Houston, Texas.

U. S. Rubber Promotes Scoville

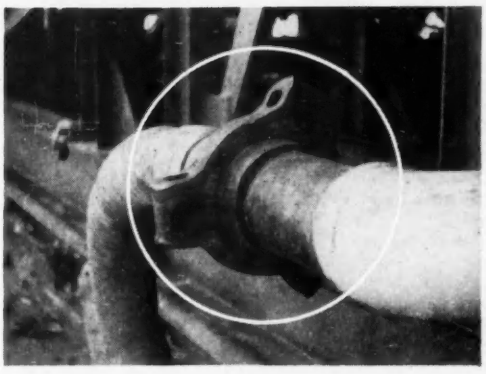
United States Rubber Company has appointed Warren E. Scoville, Jr., assistant manager of the development department's Passaic, N. J., plant. Scoville has been employed in the development department since graduating from Stevens Institute in 1934.

It's Wise to Standardize with WECO

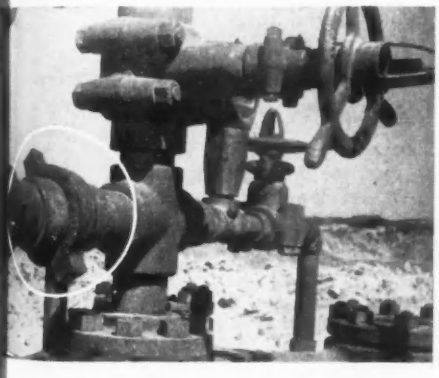
MOST COMPLETE LINE OF WING UNIONS IN THE WORLD



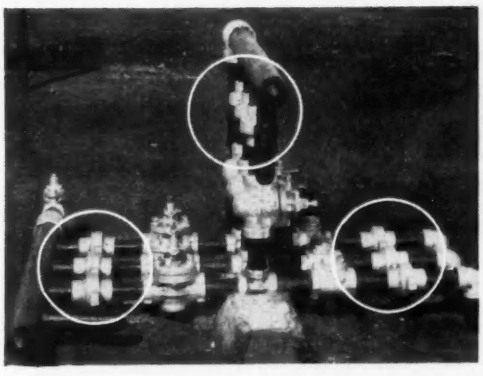
WECO Fig. 600 Unions on a mud line manifold. "Standardize with WECO" for this service to save time and trouble.



This WECO FIG. 100 on a mud return line can be made up with hammer or bar.



Four inch FIG. 602 on pump discharge withstands severe vibration and pulsation without leaking.



These versatile FIG. 400 WECO UNIONS speeded assembly of this production tank header.

Standardizing with WECO UNIONS saves time, reduces cost, minimizes errors, avoids misfit and makeshift connections. WECO's "Most Complete Line of Wing Unions in the World" gives you exactly the size, type and pressure union you need for every oil field service.

WECO UNIONS give you leak-proof connections . . . withstand years of hard use and service . . . make-up and break-out repeatedly without damage to threads or seat. Perfect interchangeability of parts in same size and pressure assures maximum efficiency in piping layouts, particularly where they are disassembled and re-assembled frequently, such as on the drilling rig.

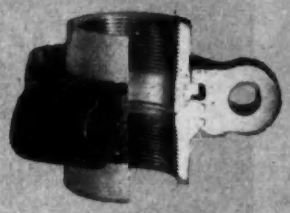


FIG 100
1000 p.s.i. TEST
SIZES: 2", 2½", 3", 4", 6", 8"

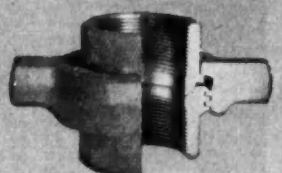


FIG. 200
2000 p.s.i. TEST
SIZES: 1", 1¼", 1½", 2", 2½" 3", 4", 6", 8"

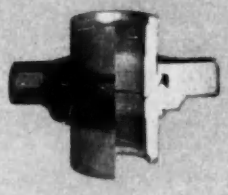


FIG 400
4000 p.s.i. TEST
SIZES: 2", 2½", 3", 4", 5½" O.D., 6", 7" O.D., 8", 10"

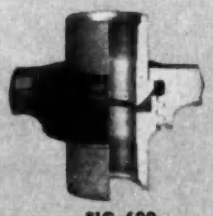


FIG 600
6000 p.s.i. TEST
SIZES: 1", 1½", 2", 2½", 3", 4"

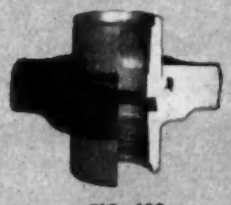


FIG. 602
6000 p.s.i. TEST
SIZES: 1", 1½", 2", 3", 4"

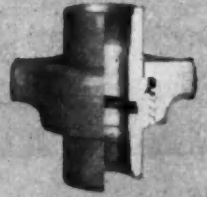


FIG 1502
15,000 p.s.i. TEST
SIZES: 2", 2½", 3"

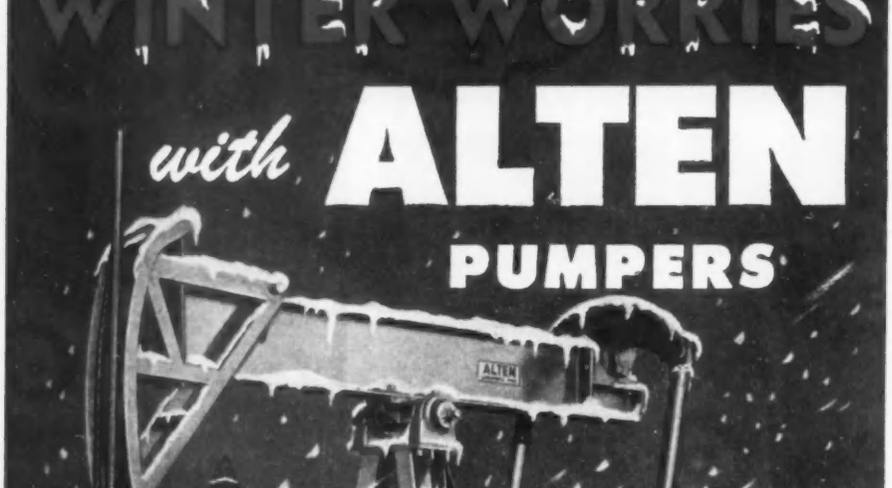
PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

It's Wise to Standardize with... **WECO...**

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
HOUSTON 1, TEXAS
CHIKSAN COMPANY
Brea, Calif. Chicago 28, Ill. Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

No WINTER WORRIES with ALTEN PUMPERS



When you count the reasons why these units pump more fluid at lower cost, add this fact: Alten Pumpers continually perform at full rated capacity through harshest winter weather.

Alten — and Alten alone — has the high level oil system that keeps bearings in oil . . . guarantees complete positive lubrication with the first turn of gears . . . no damage, no operating delay from heavy cold thickened oil. Alten construction is weatherproofed throughout . . . all exposed parts protected from freezing rain, snow and ice. Here is the unit to buy!

AT YOUR SUPPLY STORE

Sales Offices:
Olney, Illinois
Hutchinson, Kansas
Duncan, Oklahoma
Abilene, Texas

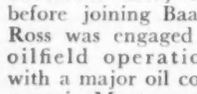
—ALTEN—
Foundry & Machine Works, Inc.
LANCASTER, OHIO

Branch Warehouses: Wichita Falls & Houston, Texas, Casper, Wyoming, Edmonton, Canada

Baash-Ross Names R. L. Bowcutt Rocky Mountain Sales Manager

R. L. (Don) Bowcutt has been named district sales manager for the Rocky Mountain and Western Canada operations of Baash-Ross Tool Company. Bowcutt has served the company for a number of years in the Rocky Mountain area, and before joining Baash-Ross was engaged in oilfield operations with a major oil company in Montana. He will make his new headquarters in Casper, Wyo.

R. L. Bowcutt



T. L. Fontaine

A. Y. Gunter

Beaumont Iron Works Opens Consolidated Sales Office

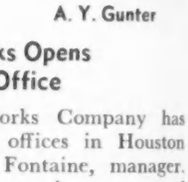
Beaumont Iron Works Company has consolidated its sales offices in Houston under T. L. (Doc) Fontaine, manager. A. Y. Gunter was named manager of southwest sales. T. L. Fontaine, Jr., is also assigned to the Houston office.

C. A. Warthen was assigned to the Odessa, Texas, office, and C. P. Gillespie was appointed manager of the office at Houma, La.

Larkin Appoints William Powell Ilinois Basin Representative

Larkin and Company, Inc. has appointed William E. Powell to succeed Pat Clark as Larkin representative in the Illinois Basin area.

Powell will make his headquarters in in Olney, Ill., and will be responsible for selling Larkin products in Indiana, Illinois and western Kentucky. He formerly was with Bird Well Surveys, Bradford, Penn., and Otis Eastern Service in Wellsville, N. Y.



William E. Powell

Hall Rejoins McCullough Tools

D. J. (Don) Hall has been appointed regional sales manager for McCullough Tool Company in the Western and Rocky Mountain divisions. Hall joined McCullough in 1942 as a salesman at Bakersfield, Calif., becoming sales manager in 1945. In 1950 he joined Great Lakes Corporation as regional manager of the California, Rocky Mountain and Canadian divisions.

Magcobar Names Sales Manager As Assistant to President

Murray C. Moffatt has been appointed manager of the Fort Worth division of Magnet Cove Barium Corporation and will replace Bill Ray. Ray was recently elected assistant to the president. Moffatt, formerly sales manager of the division, was earlier associated with Gulf Oil Corporation in Fort Worth as petroleum engineer. He is a graduate of the University of Texas in petroleum engineering.

Earl McArthur

Earl N. McArthur, Jr., was recently named district service supervisor at Victoria, Texas. Previous to his appointment he was a Magcobar field service engineer in the Victoria area.

Magcobar Names Frank Ford, Jr. As Supervisor Houma District

Frank Ford, Jr., was recently promoted to district supervisor of the Houma, La., district of Magnet Cove Barium Corporation. Ford has been located in the Houma district since he was employed by Magcobar in 1948. He replaced R. E. Hinchliffe who was transferred to the Lake Charles district. Before joining Magcobar, Ford worked as rotary helper with Shell Oil Company, Bankhead Drilling Company, Sugarfield Oil Company and Loffland Brothers Drilling Company.

Conroy Named Sales Manager

Eugene F. Conroy has been appointed district manager of the New York office of Spang-Chalfant Division, The National Supply Company, succeeding W. J. Stanton who retired after 20 years service. Conroy has been associated with the steel pipe industry for 40 years, having served with Central Tube Company in the New York area from 1913 until the company was purchased by National Supply in 1940.

Quaker Rubber Names Sales Head

Named general sales manager for Quaker Rubber Corporation, a division of H. K. Porter Company, Inc., J. R. Alexander will be in charge of all sales activities. Associated with Quaker since 1944, he joined the company as sales representative and has been successively city sales manager and district sales manager.

Leichliter Elected Executive Of American Steel & Wire Unit

American Steel & Wire Division of U. S. Steel Corporation has named Van H. Leichliter vice president—operations. He has been assistant executive of operations since February, 1950, and succeeds Walter F. Munford who assumed the presidency of the Division on January 1. Leichliter has been with American Steel & Wire since 1930.

Steel Pipe Veteran Retires

W. J. Stanton, a veteran in the steel pipe industry, retired recently as district manager of the New York office of Spang-Chalfant Division of The National Supply Company. Stanton had been with the Division since 1932.

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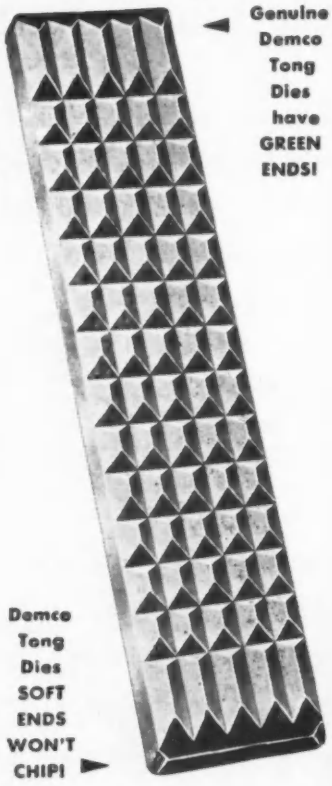

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SQUEAKS from the BULLWHEEL

His Jaws Still Work

A lion got loose at the circus and ran toward a man in the audience. The man broke and ran. "Don't be afraid," called the trainer, "That lion hasn't got any teeth."

"Maybe not," the fellow panted over his shoulder, "but I'm not going to stand here and be gummed to death."

•

Name Your Poison

The young romeo parked his car in the country and said to his date: "Are you a Chesterfield or a Camel girl?"

"What do you mean?"

"Do you satisfy or walk a mile?"

•

New Development

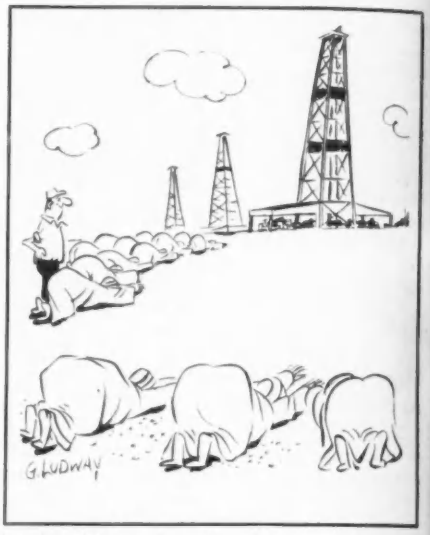
A Navy physician on a battleship in the Pacific received a snapshot from his fiancee. It showed two couples smiling on the beach while his girl sat alone at one side, forlorn and lonely. The letter explained that she spent her time alone fretting away the time until he returned. The delighted officer displayed the snap to his fellow officers, but that night, after studying the shot thoughtfully, he broke the silence: "John," he said, "I wonder who took that picture?"

•

Branding Time

A young man took his city-bred girl friend to a night club in Las Vegas, a place which was decorated elaborately in cowboy style.

They were there a short time when the girl arose and excused herself to go have her face made-up. She returned a moment later, her countenance a blushing red. "Ted," she said, "you'll have to help me. Am I a heifer or a steer?"



To Each His Own Creed

Census Taker (to woman at the door): "How many in your family?"

Woman (snapping): "Five. Me, the old man, kid, cow and cat."

Census Taker: "And the politics of your family?"

Woman: "Mixed. I'm a Republican, the old man's a Democrat, the kid's wet, the cow's dry and the cat's a free trader."

•

Had A Point There!

At the football game, the boss suddenly came in behind his office boy, and tapped him on the shoulder.

Boss: "So this is your uncle's funeral?"

Quick-witted Lad: "Looks like it. He's the referee down there!"

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